MOTOR AGE

Vol. XXIX
No. 18

CHICAGO, MAY 4, 1916

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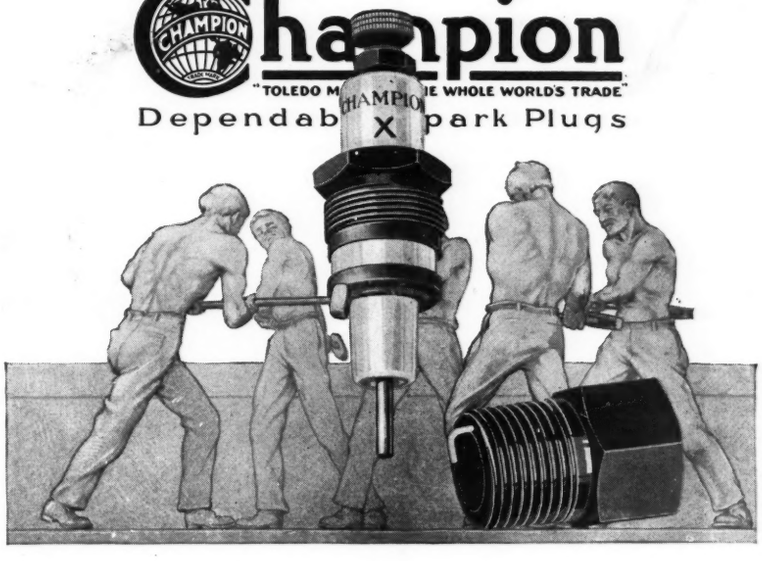

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MOTOR AGE

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ANNOUNCEMENTS

"The Voyage of the Hannah Maria," which will be a feature article of Motor Age, issue of May 11, will be of interest to all lovers of out-doors and of particular value to those who expect to camp en tour. In connection with an exceptionally well-told story is reproduced a map showing camping sites and distances between them on two routes across the continent, also detailed expenses.

—ANNUAL TOURING NUMBER—

Motor Age's Annual Touring Issue, which will bear the date of May 18, will offer the most comprehensive study of America's tourgrounds ever given the public in one issue of any magazine. In planning your summer tour, no matter in what part of the United States you wish to go, this issue will give you a graphic picture of that individual section, and tell you how to get there and what to see.

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MOTOR AGE

Steel War Horses of Verdun

Convoy of White trucks passing through a bombarded suburb of Verdun

By W. F. Bradley

Motor Age's Special War Correspondent in Europe

EAST of Verdun the German lines project into France in the form of a huge V, the point of the V being close to St. Mihiel about 25 miles back of the Verdun fortress. With such a position the German long-range artillery could bombard not only the country parallel to the main French front, but a considerable portion at right-angles to it. From their point near St. Mihiel they could drop shells on the main railroad line from Paris to Nancy, in the neighborhood of Commercy, and in consequence, for over a year, have obliged the French to make a detour to the south over a single track winding line, where quick service is impossible.

These conditions doubtless weighed considerably with the military authorities when the attack on Verdun was decided.

GENERAL JOFFRE TO VERDUN MOTOR TRANSPORT CORPS

SINCE the renewal of active operations in the Verdun district the automobile service has furnished a considerable effort in order to assure the transportation of troops and the carriage of ammunition and food. Thanks to the fine organization of the convoys on the one hand and the high sense of duty of the men on the other hand, this transportation has been carried out with the greatest regularity and in a remarkably orderly manner. The General in Chief expressed his highest satisfaction to the officers and men of the automobile service having taken part in these operations.

(Signed) J. Joffre.

The preliminary was a systematic bombardment of all the railroad lines within range of German guns, leaving a French army of not less than 250,000 men entirely dependent on motor cars for movement, food and ammunition. This is the first time in the history of the war that a great army, while fighting desperately, has been deprived entirely of railroad service. In all other cases, and at all other points of the front at the present time, the railroad and the motor car work in conjunction, with a final distribution when necessary, by hand or by light horse teams. It is valuable testimony to the efficient organization of the motor service that it has been able, under the most difficult conditions, to keep the army reinforced and to supply it regularly with food and am-

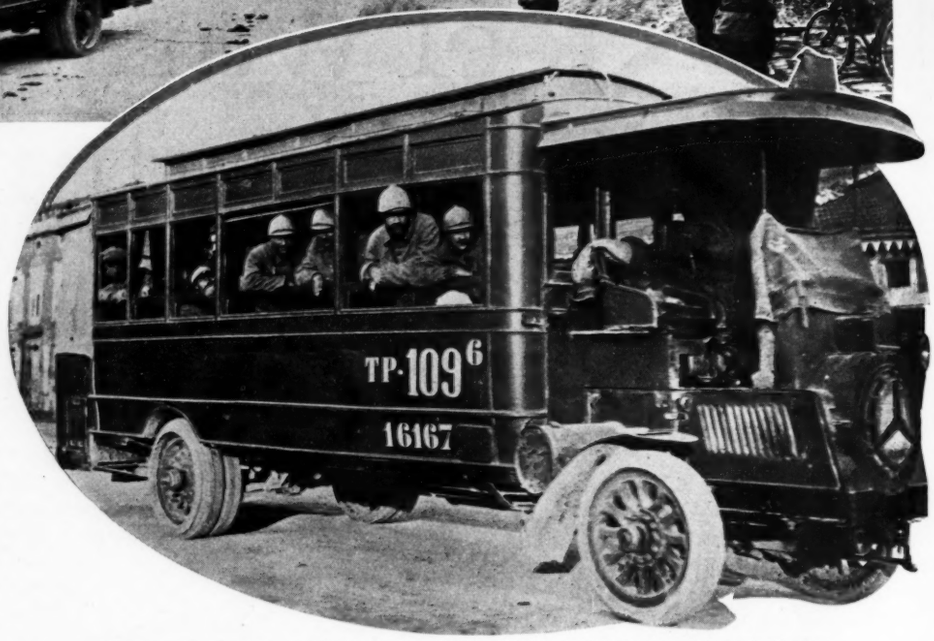
Paris motorbuses coming through Verdun with fresh troops for the firing line

munition, thus making it possible for the troops to arrest the most powerful and determined attacks since the war began.

Troops Moved by Motor

Members of the motor corps, returned from Verdun, describe that district as being alive with motor convoys of every possible kind. Every type of motor vehicle from powerful four-wheel drive and caterpillar tractors to motor bicycles is to be found on duty in this district. American trucks are very plentiful in the Verdun sector, White's predominating, with also a large number of Packards. Fiat has supplied a large number and various French makes are represented.

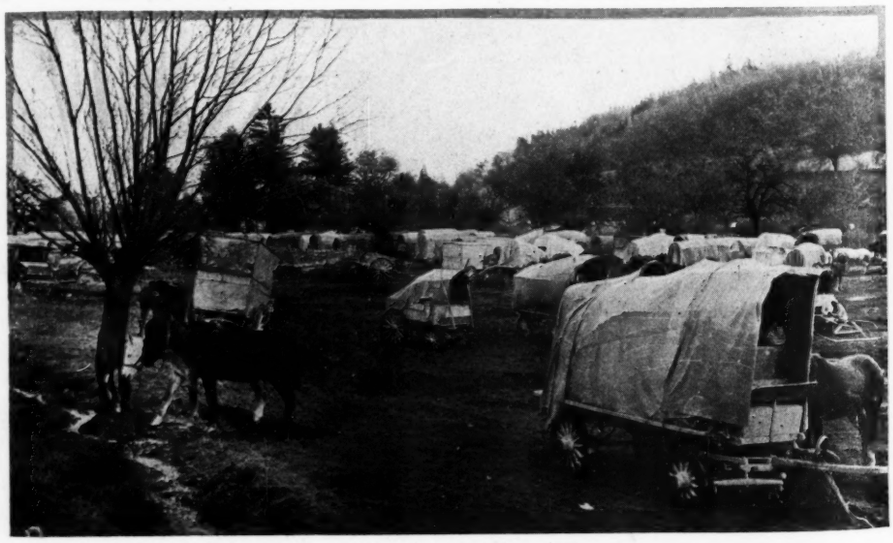
All the rapid movements of troops are carried out by motor vehicle, and it was owing to the rapidity with which the Transportation of Troops sections got to work in bringing up fresh men that the initial success of the Germans was arrested. Although all army trucks are fitted for the transportation of men in case of emergency, there is a special organization, known as the T. P.—transport personnel—designed for this work. The vehicles used are either the original Paris buses or the same type of chassis with a special single-deck body. After taking the 1,100 buses in service in Paris when war broke out, the De Dion-Bouton and Schneider companies were ordered to continue making this type for the army, and all those which could be assembled by the bus company were immediately requisitioned. The great advantage of this type for troop transportation is the big body area in relation to the total area of the vehicle. The driver is over the motor, this being the only type in the army where the motor is not under a hood, and the frame members have lateral and rear extensions to allow of a body flush with the hubcaps, and to give a big rear platform. Some of these vehicles have been in service since August, 1914, and thus are approaching the end of their second year of actual warfare. The later ones have the same chassis details but lighter and cheaper bodies. The substantial double roof with ventilating windows, also side and front glass windows, have been abolished; from the plain roof canvas sides with mica windows can be rolled down to attach to the side panels. This structure is lighter than the well-finished bodies for city service and also much more suitable for war conditions.



One of the Paris motorbuses in the transportation of troops service at Verdun

Citizens Do Not Flee in Terror

In operations such as those at Verdun the army has to undertake the removal of the civilian population. Contrary to what might generally be supposed, the rural populations do not flee in terror at the sound of battle. Many of them are so unconcerned at the booming of the guns that they pay little attention to the recommendations to move to the rear, preferring to wait until a military order is given to evacuate the district. Then the army trucks have to come into service, for there are neither railroads nor horses. Women, children, and invalids, together with such small hand baggage as it has been possible to save, are loaded



One of the horse transport depots in the vicinity of Verdun

An open-air gasoline depot near Verdun. Each drum and box contains 12 gallons of gasoline

into the trucks and taken to the nearest railroad station, from which they can be sent to some point in the interior.

Usually household furniture is abandoned. Those who are the fortunate possessors of horses load their most valued possessions on wagons, being helped in this work by friendly soldiers. It is rather curious to note that in such times of disaster bedsteads and bedding always seem to rank first among household possessions. The interiors of hundreds of homes are carried into the streets in the hope that by some lucky chance they may find a team to take them away. If they are not destroyed by the enemy's shells, the probabilities are that they will eventually give a little additional comfort in some dug-out or trench. Looting is a military crime, but when a damaged house is in danger of total destruction, every soldier believes he is doing a kindness to himself and to his comrades by taking away everything that can be saved.

There is a particular instance of a house, partly destroyed by German guns, from which the furniture disappeared piece by piece into the surrounding trenches. An old car, a 1902 Metallurgique, with open timing gears, was dug out of the wreckage of an outhouse, and got away, not without great difficulty, in the dead of night. After being completed with spares intended for American trucks, it proved a slow, noisy, and reliable runabout for the sub-officer in charge of a convoy. When the house had been cleared somebody coveted a part of the flooring for his section of trench; somebody else desired the same boarding to improve an underground shelter. Later the wood staircases found their way underground; then a section of a wood beam was sawn through and taken away; one by one the surrounding beams followed in the same direction until at last it became a debatable point whether any more wood could be taken out of the building without the roofs and walls collapsing on the invader. A gusty night, and the house, picked as clean as dogs ever licked a bone, no longer offered itself a target to German shells.

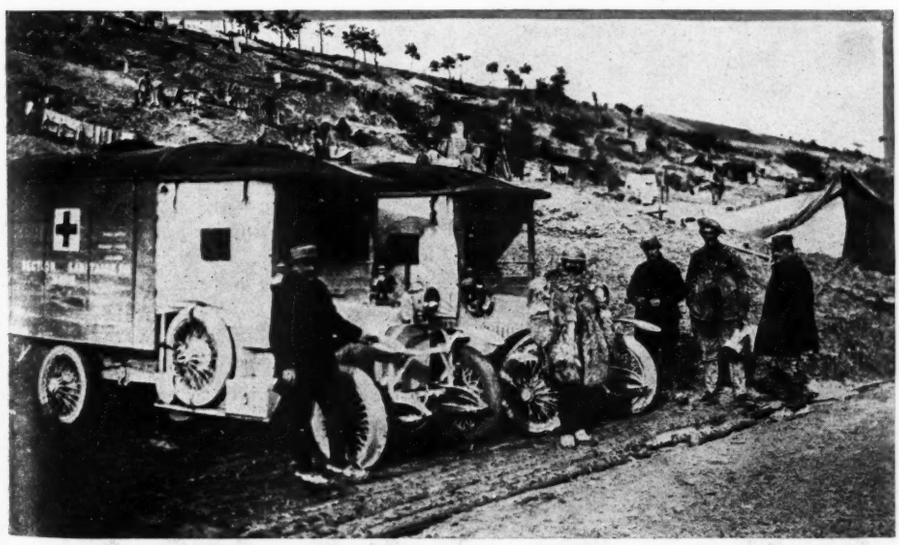
In a district of intense motor activity such as Verdun, every care is taken to keep the roads in good condition so as not to interfere with the regularity of traffic. Gangs of men are employed breaking stones and carting the material to the roads needing it. The broken stone is laid on the sidewalk ready for use when the roadmaking gang comes along. At various points along the road shelters are formed by making a level clearing and covering it with logs of trees parallel to the road. These shelters can receive a certain number of cars, particularly ambulances and staff cars, which stand on a sufficiently solid surface to get away quickly when required, and yet do not encroach upon the road surface.

Policing is done very thoroughly by gendarmes specially detailed for this work. These men verify the passes held by drivers, or by officers in charge of convoys, see that the cars follow the routes designated, that general rules of the road are observed, and that no obstructions are allowed to be formed in villages or on bridges.

Trucks Find Immediate Use

American trucks imported for the French army no longer make their initial trip from the port to the central depot near Paris without a load aboard. It has been the practice to put these trucks in charge of military crews and send them by road from Havre, St. Nazaire or La Rochelle to Paris under their own power. These trips always were made empty, as a matter of official routine, although these three ports, and particularly Havre, were congested with hundreds of tons of goods the railway was incapable of handling. Under the new arrangement every convoy going out of these ports toward Paris will pick up a load of either military material or general merchandise and will deliver it at Paris or at some point along the route.

The first two of these live convoys comprising sixty-six Whites and forty Velies, carrying between them 232 tons of general merchandise, came through to Paris in one week early in April. These 232 tons were brought through at practically no cost; without the trucks the goods still would have been lying on the dock awaiting railroad facilities. The system is so simple and is so satisfactory to everybody concerned that the only surprise is that it was not adopted earlier. For over a year big convoys have been coming empty 4 or 5 days a week from Havre to Paris while perishable goods and urgently needed material was left behind



A medical formation at the front. Ambulance waiting at a roadside garage formed by placing logs and trees on a cleared space

An 89-horsepower tractor is given strenuous test. This is made by the Morton Truck and Tractor Co., Harrisburg, Pa.

British artillery in France insist on keeping to the left of the road, which custom forced Red Cross ambulance into the ditch

105-Millimeter shells brought to a depot near Verdun by trucks

French soldier repairing 75-millimeter gun near Verdun

on the docks. An intelligent understanding between civil and military authorities was all that was needed to overcome the difficulty.

Compulsory Technical Education?

The French motor industry is directly interested in a new law before Parliament providing for free and compulsory technical education for workers under 18 years of age. The general scheme is based on that already adopted by Germany, Austria and Switzerland. It provides for the establishment of technical schools in every district, the central and local authorities sharing the expense, which must be attended by all young factory workers. These schools can be established by employers in the factories, if desired. Lessons will be given during the legal working day, and will be not less than 4 hours per week, or 100 hours per year minimum, and 8 hours per week and 200 hours per year maximum. Factory heads must see that their workers attend. At the end of three years an examination will be held with a view to obtaining a technical certificate. Those failing to pass will be given a paper certifying their attendance and will be free from further obligations under the scheme.

Seigneur, crack French racing cyclist, now driver for General Joffre

Only motor car drivers who held a Government driving license prior to the war now are eligible for truck and car service in the French army. This measure has been adopted in order to weed out incompetents. During the last 12 months an immense number of motor schools have been formed in France and soldiers on leave have been enticed to take driving lessons. Government licenses have been granted these pupils, but very few of them can do more than hold a steering wheel and the men are really dangerous in active service among the convoys at the front. Under the new scheme men who have had three or four driving lessons and no practical road experience cannot get into the army motor service. Naturally the schools will lose a few thousand clients.

Water-Cooled Aero Engines

In the extension of the allied aeroplane fleets, there has been an important slide to the fixed-cylinder, water-cooled six-, eight- and twelve-cylinder engines, to the detriment of the rotary types which held the board prior to the war. It is no secret that French, Italian and English firms more or less faithfully have copied the Mercedes six-cylinder, water-cooled engine, which is practically identical in

design to the 1914 Mercedes Grand Prix engines, one of which is now owned by Ralph de Palma. The features of these engines are steel cylinders with steel jackets, either two or four valves in the head, operated by an overhead camshaft. While some makers have produced an exact copy of the Mercedes, others have made detail improvements, and a few have produced the same type of engine with twelve cylinders. A respectable number of captured Mercedes aeroplane engines are in use on French aeroplanes, and many partly damaged engines have been put into service again after being repaired with spare parts from the French shops.

This state of affairs is well known to the Germans, and, according to an authenticated story, the Mercedes company, at Mannheim, Germany, succeeded, via America, in sending a threatening letter to Louis Renault, one of the manufacturers who has produced Mercedes-type motors. It was claimed in this letter that Renault had infringed Mercedes patents, and he was informed that he would be made to regret his action after the war. Louis Renault, according to this story, sent a one-word reply to the German factory. The word is the one used by Cambronne when the English called upon him to surrender at Waterloo.

Italian Shop Workers Punished for Absence or Tardiness

TURIN, Italy, April 20—Extensions are the order of the day among Italian motor factories, and in every shop speeding-up is being attempted. The factories are supplying all their own army's requirements and are shipping considerable to France. No foreign trucks or touring cars are being imported into Italy. Shipments to England appear to have fallen off, the best Italian customer now being France. In

D'Avarary, formerly Buick agent in Paris, driver for the Prince of Serbia while in Paris

taking as many Italian trucks as possible, in preference to Americans, the French authorities avoid freight difficulties and the attendant high cost, and also have the advantage of a favorable monetary rate of exchange. The exchange betwcen France and Italy is about 10 per cent in favor of the former country, while between France and America it is 20 per cent in favor of the latter country. It is claimed that practically all the trucks attached to the Verdun army have been supplied by Fiat.

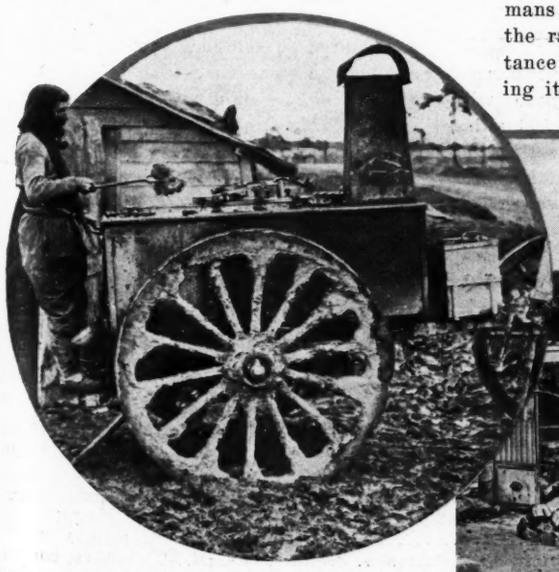
This army of 250,000 men is entirely dependent on motor traction for its food, ammunition and general transportation. The position here is such that the Germans have been able to bombard all the railroad lines a considerable distance in the rear of the French, making it necessary for everything to be brought up by road. This appears to be the only case along the whole battle front of France in which complete dependence has had to be placed on motor vehicles. The manner in which the French have been able to hold in check the most formidable attempts of the German army to break through is proof that automobile traction has been equal to the task imposed upon it.

Increased work has been thrown on the Italian motor car factories by the extension of the aeroplane service. After hesitating a long time between the airship and the aeroplane, and being the victims of interested partisans, the Italian authorities, like those of France and England, have decided definitely in favor of the heavier than air type. A well-defined program is in course of execution, and its completion will place Italy in the front rank. In aeroplane design the Italians are receiving all their inspiration from France, every leading French army type of machine being built under license in Italy. The Italians are more independent as regards motors, and although the same general lines are being followed as in France, the design is entirely Italian. All the Italian motor car factories actively are producing aeroplane engines, and in addition the Italian Gnome and Rhone Co. is producing rotaries.

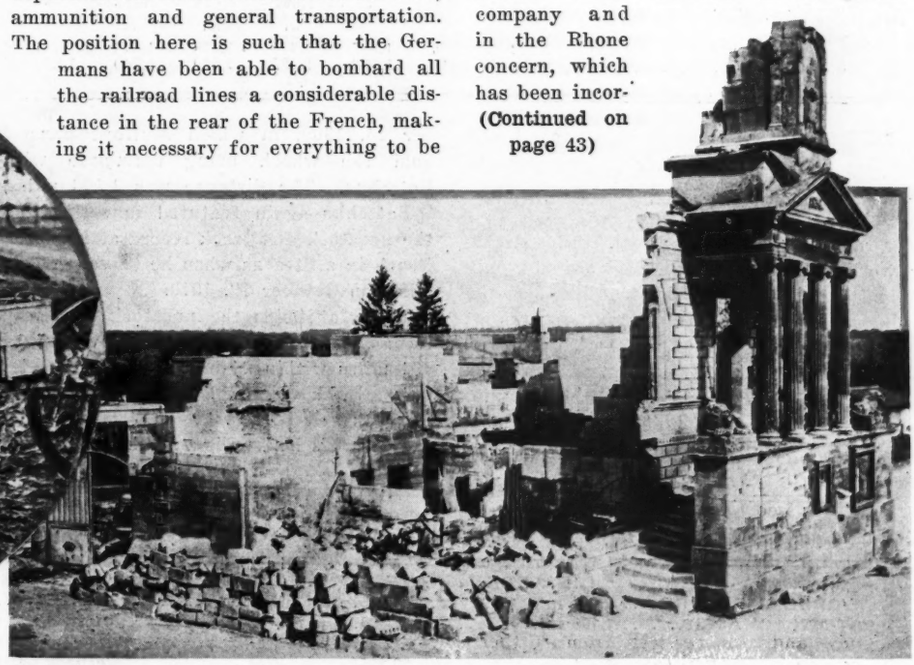
Preference Shown in Motors

As in France, the Rhone motor appears to be preferred to the Gnome. This company was established in 1912 with less than a score of workpeople, and now has several hundreds and is still extending. Quite recently the Gnome people of Paris sold out the greater portion of their holdings in the Italian branch to a French group in which the Darracq Automobile Co. predominates. The Sequin Bros., who founded the Gnome company in France, retain all their interests in the parent company and in the Rhone concern, which has been incor-

(Continued on page 43)



The regimental cook attending to the duties on the roadside near Verdun



Town hall at Sommeilles near Verdun, destroyed by German bombardment

Hudson Stock Chassis Sets New 24-Hour Mark

Ralph Mulford at Wheel Pilots Super-Six Over 1819 Miles in Race Against Time, Averaging 75.8 M. P. H. in World's Record Drive

SHEEPSHEAD BAY SPEEDWAY, New York, May 2—Special telegram—Ralph Mulford, at the wheel of a Hudson Super-six stock chassis, today broke all records for 24-hour distances by covering 1,819 miles in his twice-around-the-clock whirl of the Sheepshead Bay speedway. He shattered the former world's record for 24 hours of 1,581.8 miles, held by S. F. Edge and the Napier car. He eclipsed all American stock and non-stock records for the time.

Mulford never left the wheel of his mount but, driving without relief, kept the Hudson circling the board oval hour after hour at a speed which at the end of the 24 averaged 75.8 miles each 60 minutes. This is almost 10 miles per hour faster than Edge's previous world's record. The Napier average at Brooklands was 65.9 miles per hour.

Mulford's fastest lap was the eight hundred and thirteenth, after he had run 1,626 miles. In this lap he averaged 89.4 miles per hour. He made sixteen stops in all, the longest being 6 minutes in duration.

In endeavoring to break the existing world's 24-hour record, Mulford not only had a high mark to shoot at but also the opportunity of breaking four records at the same time, one of which was his own. The world's record until now has been held by S. F. Edge, who, with a six-cylinder, 60-horsepower Napier, made the mark of 65.905 miles per hour for a 24-hour run on Brooklands tracks in England on June 29, 1907. The distance covered in the 24 hours was 1,581 miles and 1,310 yards.

Edge's record, like Mulford's record, was made in a time trial and not in competition. Until the first of this year there has been no regulations of the American Automobile Association by which American 24-hour records could be established except in competition. But in order to permit these 24-hour trials, the A. A. A. contest board this winter established a special class for non-competitive trials against time.

Maintains High Average

There has been, however, three 24-hour American records allowed by the A. A. A. These all were made in track races and the beating of Edge's world's record has simultaneously eclipsed all existing American records for 24 hours. One of these is the stock chassis record made by the Lozier at Brighton Beach track October 15, 1909, in which Mulford himself held the wheel, being teammate with Patschke. The distance was 1,196 miles.

Patschke again featured in setting up the nonstock dirt track record at Brighton Beach in a Stearns when he traveled 1,253 miles on October 19, 1910.

The Fiat holds the nonstock speedway record, winning this mark by covering 1,491 miles within 24 hours at Los Angeles board track on April 8, 1911, driven by Verbeck and Hirsch.

Mulford's Hudson is a stock chassis similar to that which made the record of 102.4 miles per hour at Daytona Beach recently. The ordinary body has been removed and a tapered tail fitted. Goodrich Silvertown cord tires, 34 by 4 inches in size, are used. The gear ratio is 2 11-18 to 1 and Veedol oil and Whitmore compound grease are used. The car traveled with the headlamps and sidelamps lighted during the entire distance. At end of fifteenth hour he was ahead of the record by 152 miles, having made the 1,158 miles, as compared to 1,000 made by Edge.

Hour by hour record, old and new, is given in the accompanying table. After 15 hours Mulford averaged 77 m.p.h., 10 miles per gallon of gasoline and 150 miles per gallon of oil. His average speed at 500 miles was 77.1; at 900 miles, 77.2; at 682 miles, 77.5; at 1,100 miles, 77.04; at 1,200 miles, 77.33; at 1,000 miles, 76.4.

Up to the fifteenth hour Mulford had not changed his tires. He has changed mechanician several times, but insisted on driving the whole distance himself.

Stops were made as follows:

The first stop was made after running 284 miles, when he took on 13 gallons of gasoline and 1 gallon of oil. This stop was for 1 minute 21 seconds. The second stop was made at the end of 302 miles to take on 5 quarts of oil, 14 gallons of gasoline, and water. The second stop was for 1 minute 35 seconds. The third stop occurred after running 452 miles, when he dismounted to snatch a mouthful of food and at the same time take on 12 gallons of gasoline, 1 gallon of oil and 1 quart of water. This time he stopped for 3 minutes 15 seconds. The fourth stop came after running 604 miles, when he changed mechanicians and took on 13 gallons of gasoline and 1 gallon of oil. The fourth stop required 3 minutes 8 seconds. The The fifth stop was made after running 756 miles, for taking on 12 gallons of gasoline and 7 quarts of oil. He oiled the shock absorber also. This stop required 4 minutes 2 seconds. The sixth stop was made after

Mulford and Edge, Hour by Hour

Hours—	1	2	3	4	5	6	7	8
Edge, miles	70	144	207	271	342	407	474	537
Mulford, miles	77	154	233	308	389	463	542	616
Hours—	9	10	11	12	13	14	15	16
Edge, miles	609	670	737	799	866	938	1,006	1,068
Mulford, miles	698	770	850	923.5	1,004	1,078	1,158	1,233
Hours—	17	18	19	20	21	22	23	24
Edge, miles	1,139	1,203	1,263	1,327	1,390	1,458	1,519	1,581
Mulford, miles	1,310	1,382	1,461	1,532	1,597	1,669	1,740	1,819

Previous 24-Hour Records

	DISTANCE	AVE. M.P.H.	CAR	DRIVERS	TRACK	DATE
WORLD'S RECORD	1,581 mi., 1310 yds	65.905	Napier	S. F. Edge	Brooklands	June 29, 1907
STOCK CHASSIS	1,196 mi	49.830	Lozier	Mulford & Patschke.	Brighton Beach	Oct. 15, 1909
CLASS C	1,253 mi	52.208	Stearns	Patsche & Poole	Brighton Beach	Oct. 19, 1910
CLASS C SPEEDWAY	1,491 mi	62.125	Fiat	Verbeck & Hirsh	Los Angeles	April 8, 1911

running 906 miles, when he took on 13 gallons of gasoline and 5 pints of water for the machine and a few bites of food and some coffee for himself. This was the longest stop so far, lasting 4 minutes 4 seconds. The seventh stop was made after running 1,060 miles, when he took on 14 gallons of gasoline and 1 gallon of oil and mended a bonnet clip. He was stopped for 4 minutes 6 seconds. The eighth stop occurred after running 1,202 miles, where he took on 12 gallons of gasoline and 1 gallon of oil, which required 3 minutes 30 seconds.

He slowed down after going 1,244 miles and stopped after running 1 lap more, or 1,246 miles, because the officials wanted to determine if he was in good condition to continue the drive. After a brief wait Mulford went ahead with the intention of finishing the 24-hour drive.

RITTMAN PROCESS FOR PEOPLE

Washington, D. C., May 1—Special telegram—The Rittman process of obtaining gasoline from crude oil is to be the property of the people of the United States. The Senate today adopted the resolution of Senator James, which permits Secretary of Interior to accept it in the name of the United States.

The process may be leased only to persons or firms who will agree that if they discover any improvements to it they will give them to the United States instead of patenting them for themselves. This move was taken to prevent any monopoly becoming through a slight improvement the controller of this whole process. Rittman has announced he will concur in these terms.

FIX DATE OF ROADS CONVENTION

New York, April 28—The fourteenth annual convention of the American Road Builders' Association, known as the seventh American good roads congress, and the eighth national good roads show, will be held in Mechanics' Hall, Boston, Mass., during the week beginning February 5, 1917.

BUICK SETS COAST MARK

San Francisco, Cal., April 29—California's greatest road record was smashed by a 1916 Buick six last Tuesday when the car made the run of 457 miles in 10 hours 47 minutes, slashing 1 hour 23 minutes off the record established by the eight-cylinder Cadillac in June, last year. The Buick averaged a speed of 43.6 miles an hour in navigating the distance.

The car was driven by Joe Nikrent and Earl Jackson, the former being at the wheel from Los Angeles to Fresno, a distance of 235 miles, which he covered in 6 hours 5 minutes, and Jackson drove the remaining 222 miles in 4 hours 42 minutes.

Nikrent's path was over a steep mountain range and through some desert country. Not a stop was made along the entire path for even a tire change.

Rim Suit Re-Opened

Universal Company Enters Petition for Injunction to Halt Perlman Production

Patents of New Corporation Attacked as Not Being Basic

DETROIT, Mich., May 2—Special telegram—Suit was filed in the United States district court at Chicago on April 29 by the Universal Rim Co., Chicago, against the Perlman Rim Corporation, the recently organized New York corporation which now has an established business at Jackson, Mich., as a result of the purchase of the Jackson Rim Co. This action by the Chicago firm injects into the already complicated rim situation a new element of trouble, in that the Universal concern alleges that rims made by the Jackson Rim Co. are infringements of the Baker and other patents owned by the Universal company.

The patents owned by the Universal Rim Co. are those allowed to E. K. Baker, Joseph A. Anglada, W. McL. Lottredge and C. G. Hawley, and the earliest is dated October 21, 1902, to Lottredge for a tire; March 29, 1909, to Baker and Hawley for a pneumatic tire mounting, and patents frequently thereafter up to June 30, 1914.

R. A. Parker, the Detroit patent attorney, who figured so prominently in the Selden patent case on the side of the Ford company some years ago, is acting for the Universal company, and he states that prior to the purchase of the Jackson Rim Co. the Perlman organization did not strike any snags. A permanent injunction has been asked to put a stop to further rim manufacture until such time as the Perlman concern and Jackson Rim Co. have given an accounting of profits. It is pointed out that this suit, if successful, would serve to indicate that the Perlman patents are not basic in the rim field.

Although the present action is based upon fifty-two distinct claims in twelve different patents, the chief claims of infringement made by the Universal company are on, first, the use of a transversely split rim which permits the rim to be easily forced into helical form for easy removal and tire mounting; second, on a transversely split rim with rim-end connecting means which caus the rim to act as though it were endless when on the wheel; third, the centering and supporting studs or projections on wheel or rim by which the rim is centered and supported upon the wheel.

ALLEGE PATENT INFRINGEMENT

Hartford, Conn., April 28—The Atlas Ball Bearing Co., the Standard Roller Bearing Co. and Robert W. Woodward, Jr., and S. Lawrence Bodine, acting receiver for the Standard Roller Bearing Co., have filed a bill of complaint in the United States district court against the Abbott Ball Co., Hartford, Conn. It is alleged that the Standard Roller Bearing Co. is the owner of a patent covering the grinding of steel balls by machines and that, after the appointment of receivers in 1913, the receivers, with the consent of the courts, gave the Atlas company the right to manufacture the machines under license. It is alleged that George E. Abbott and the Abbott Ball Co. are operating in infringement of letters-patent.

HOLD GOODYEAR PATENTS INFRINGED

Toledo, O., May 1—"Decree will run for the plaintiff finding both his patents valid and infringed by the defendant.' So runs the concluding sentence of Judge Killetts' opinion in the suit brought by the Goodyear Tire and Rubber Co. against the Firestone Tire and Rubber Co. in a suit which has been in the courts for 3 years in which the former held that the latter's tire-making machines were an infringement upon the patents held by F. A. Seiberling, president of the Goodyear company.

The Goodyear company has been licensing the use of its tire-making machine for a number of years. This machine was designed to make the manufacture of tires more uniform than the old hand method. Mr. Seiberling and W. C. Stevens, in 1904, brought out a machine to do this work and many improvements have since been made.

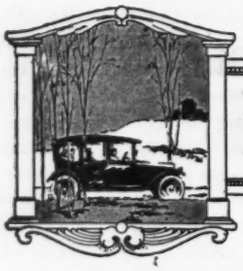
Goodyear maintained that the Firestone machines infringed the Seiberling patents. Goodyear sued and the result is summed up in the opening sentence of this story.

27,220 MILEAGE WINS AJAX PRIZE

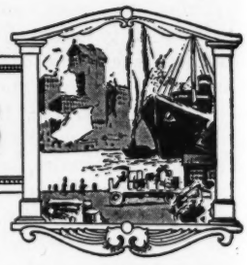
Trenton, N. J., May 2—The high mileage record in the annual contest for users of Ajax tires, to whom cash awards totaling $2,300 have just been distributed, is 27,220 miles. This was the achievement of George C. Mathis, New Haven, Conn., driver of a Cadillac owned by Mrs. J. D. Jackson. He was awarded a prize of $500. The second prize of $300 went to Charles F. Finfrock, Dayton, O., who drives the Pierce-Arrow of Maurice Costello, moving picture star of the Vitagraph Co. His mileage was 25,648. The average mileage of the winners of the first ten prizes was 23,585, and the average for the thirty who received awards was 19,386.

STOUT S-B SALES MANAGER

Detroit, April 28—The Scripps-Booth Co. announces the appointment of William B. Stout to the position of general sales manager, taking the place of R. H. Spear, resigned. Mr. Stout has figured prominently in the affairs of the Scripps-Booth concern since the production of light vehicles was begun. He was first known as engineer for the company during the design period, and when the car was ready for distribution he was placed in charge of advertising.



EDITORIAL PERSPECTIVES



Planning for Repairs

VERY few motorists realize the importance of planning ahead for the repairs and adjustments that may become necessary on their cars. Of course there are emergency repairs that cannot be foreseen, but by far the greater proportion of the work done on a car in a repair shop might just as well have been done last week as this week. Probably, had proper arrangements been made, it could have been done better and frequently at considerable less expense.

MOST motorists make the mistake of dropping unexpectedly into the service station and repair shop and insisting that their work be done and the car released at a certain hour. Sometimes no hardship is occasioned by these demands because the shop may be slack, but more than likely the owner will select a time when many of his fellows have taken occasion to have their work done and the shop is overloaded with work.

NEITHER arrangement can be satisfactory, as overtime work naturally is more expensive and is more likely to be rushed at a greater pace than is proper. Also there is a psychological reason for overtime work being less perfect than that done on the regular time because it is bound to come at a period when muscles and brains are fatigued and the men sometimes feel that they are being deprived of their rightful hours of leisure even though they may be being paid an unusually high rate for these extra hours.

WHERE it is necessary to take on extra men to get out the job, they are not likely to be familiar with the car nor have the interest of their employer or the car owner at heart as is expected of the regular employee. They have little incentive to do exceptionally good work and may loaf on the job, which means extra cost for the owner.

WHEN the car first shows signs of need for repair, it is to your interest of the car, to the interest of your pocket book, and to the interest of the service you expect to get from the repair shop or service station, that you get in touch with the latter at the first opportunity and find out when the shop will be in a position to give your car the attention it needs.

Do Cars Mean Abstinence?

OF all the multitudinous effects, good, bad and indifferent, with which the motor car has been credited, the latest is that of promotion of abstinence from intoxicating drink. The Fox River Valley Efficiency League, an Illinois association on the negative side of the liquor question, has brought forward the pronouncement that the rapid increase in the use of motor cars is certain to play an important part in decreasing the consumption of alcoholic beverages. Whether or not our dry friends are correct in their arguments, there is a certain basis of logic for their statement that drink cannot be made to fit into the age of electricity, steam and gasoline.

WITH the inherent capabilities for injury to operators and others which are possessed by a powerful heavy motor car under the control of one whose vision, quickness of action, and soundness of judgment are temporarily clouded, whether it be by excess in alcoholic stimulents or from other causes, it is certain that the present somewhat stringent regulations as regards the operation of a motor car by an intoxicated driver in time will become even more straight-laced.

WITHIN the past few years, the authorities have become anything but liberal in their views of accidents caused by drivers about whom there has been any suspicion of having been under the influence of liquor. In many cities the weight of the law is considerably more forcible upon the intoxicated driver involved in an accident than it is upon a sober one under exactly similar conditions.

IT is no more than logical to assume that these considerations would have a direct effect upon motorists themselves in preventing over-indulgence when they expect to be operating their machines. Most motorists, realizing that they are in danger of severe penalties in case of an accident if they show signs of intoxication, even though they may not admit that they are susceptible to its effects, are less prone to look upon the wine when it is red.

Marking Country Roads

DOES the dweller in a rural community appreciate the fact that the streets are marked when he visits the city? Does he make mental note of the fact that this is done for the convenience, not of the city dweller especially, but for the good of everyone who wishes to go about the city, either business or pleasure-bent? The chances are he does not. Nevertheless he benefits from this pointing of the way and it does not seem unreasonable to ask that the rural taxpayer contribute a small amount toward marking each corner of the country road.

IN early times it was the custom to put up cross-roads signs in the rural districts, which action was a great satisfaction to travelers. Now that there is such an increase in travel this movement would be all the more beneficial. It is not meant to imply that nothing along this line has been done. Motor clubs are doing more and more road marking each year, but it is not as incumbent upon the ruralties to pay for this work as it is upon a motor organization of some city?

THE country has proven a fertile field for the motor car salesman. Every country car owner must do some touring and he cannot know every road he would like to travel. If the motor club of his nearest city has found it of value to mark roads, then he should put his shoulder to the wheel and contribute his mite toward this work.

LET the country resident show as much interest in marking his community's roads as the city car owner does. Most of the marking so far has been done by the latter. It will redound to the benefit of everyone and make country touring more pleasant for all concerned. Let the country resident assume that he is in a city, say like Chicago, with none of the streets named. Wouldn't he have a rather difficult time finding some certain place? In his own community he might know every crook and turn of the road, but the man from the city, or the man 50 miles away may not know, and it is for this reason that he should interest himself in road-marking.

Easier to Sell Motor Cars Than Buggies in Country Towns

Implement Man Complains That Rural Dealers Persuade Patrons to Buy Machines Instead of Horse-Driven Vehicles

KANSAS CITY, Mo., April 29—That the trade of the implement houses of the country with respect to selling buggies has suffered because of the methods adopted by the small country town dealer of farm machinery and implements in handling motor cars is a phase of that question recently discussed by a leading member of the farm implement trade. This man is connected with one of the largest implement firms in the country and acts as general sales manager of an implement house at Kansas City.

"Nowadays it is such that when a customer goes into a hardware shop, which means an implement store, and asks for a buggy, he is immediately hurled into a campaign of literature urging him to buy a motor car. The dealer, instead of giving him what he asks for, endeavors to sell him a machine. This is, of course, an admirable condition for the motor car agencies, but hardly very pleasing to our trade.

"To prove my statement, let me tell you that the buggy business of the leading mail order house of the United States has had but a 25 per cent decrease since the motor car has come into its own, while that of ours is far, far beyond 25 per cent. This proves that it is the activities of the small town merchants that is bringing the motor car into such favor and making the sale of buggies smaller each year."

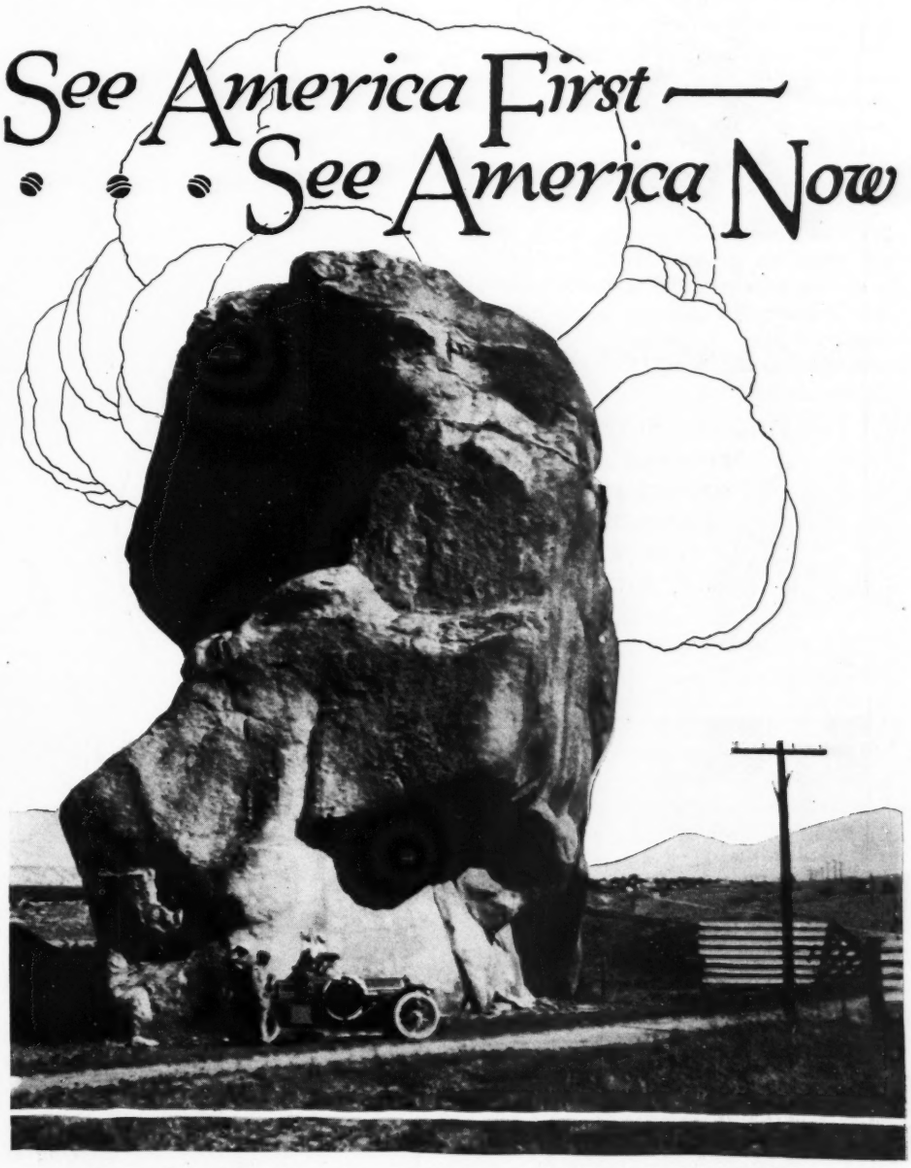
HORSE VS. CAR DRIVER

Bloomington, Ill., April 29—In the great movement sweeping over the United States in behalf of Safety First, the family driving horse should not be overlooked. This venerable equine has been too long ignored as an element of danger. It would be imagined that the family driving horse, gentle as a wooden saw-horse, had become accustomed to the motor cars and other motor-driven vehicles of our highways, and which a few years ago caused it to throw a fit and back its vehicle into a ditch or over an embankment.

In most cases, whether the approaching car purrs or roars, or comes front or rear, the f. d. h. of the present day ignores it and, as a rule does not bat an eye. On a road with nothing else but family driving horses, accidents would be the rare exception, but the f. d. h. has become a part of a swiftly moving stream of traffic and is a dangerous factor in quite another way.

While there may be reason no longer to fear that in a moment of terror it will do something wholly unexpected, there is always grave danger that it will not do the thing anticipated. Ambling along the middle of the road, the family horse is slow to move when a car comes up. The driver, when finally aroused to the necessity for some kind of action, endeavors to turn his slow moving quadruped to one side. The driver of the car is consequently called upon to take a desperate chance. He must either, in many instances, hit the buggy, violate the traffic rules by turning to the right, or run the risk of ditching his car, by trying to pass upon the left.

Most drivers will risk ditching their cars, rather than hit another vehicle. Many cars have been ditched in this way and lives have been lost. The trouble with the f. d. h. on the public highway, goes farther than the horse, extending to the driver who, in too many instances, permits the animal to take its own way, unguided and quite unconscious of the rules of the road. The horse should not be blamed as it has never been taught traffic rules. The driver of a horse should know that the right side of the road is his.

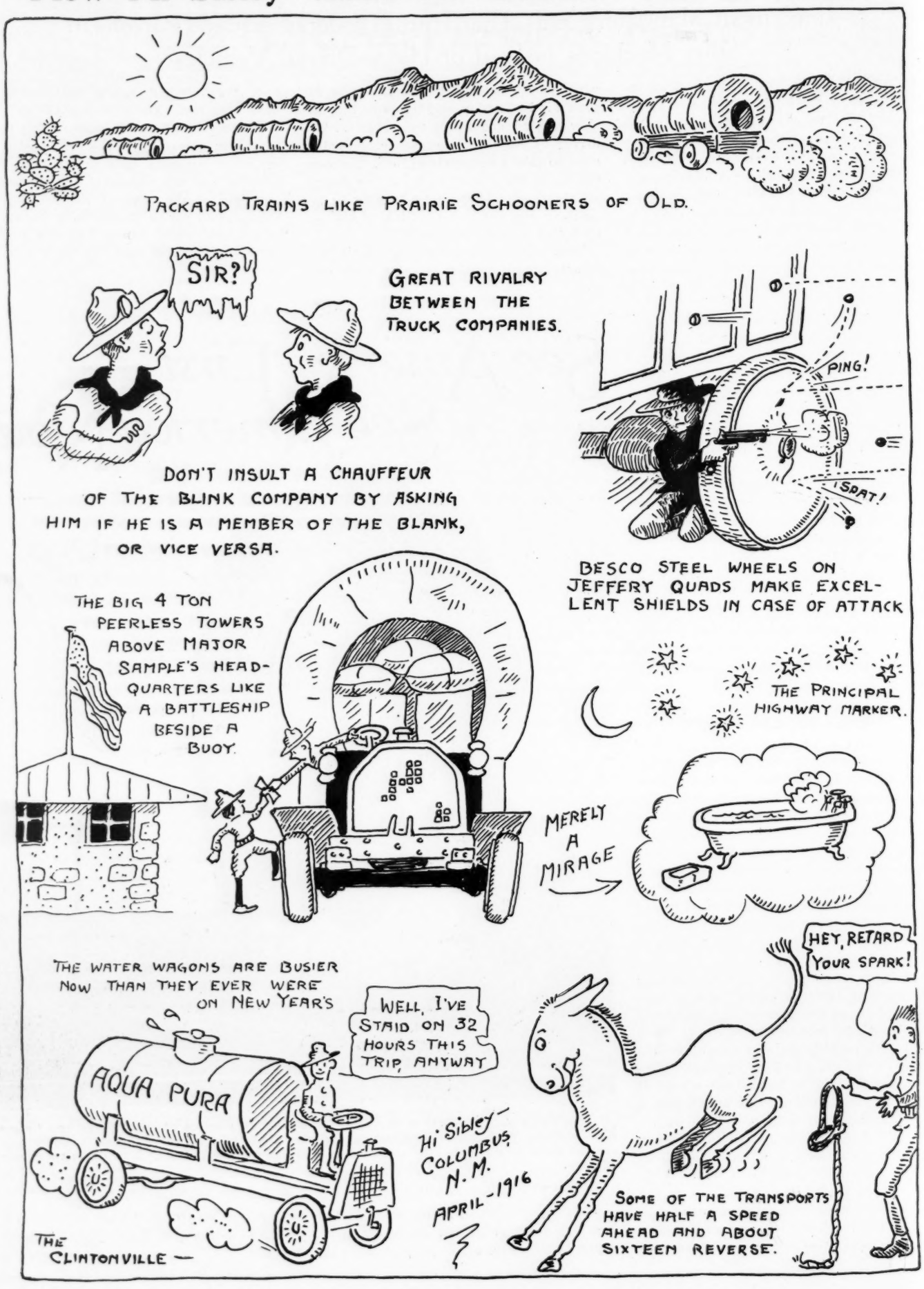


EDITOR'S NOTE—This is the seventy-seventh of a series of illustrations and thumb nail sketches of the scenic and historic wonders of America to be published in Motor Age for the purpose of calling the attention of motorists to the points of interest in their own country.

NO. 77—MONUMENTAL ROCK, JUST OUTSIDE BUENA VISTA, COLO.

COLORADO, famed for its mountains and picturesque scenery, also has some unique formations of nature, one of which, the Monumental Rock, at Buena Vista, is shown above. This towers about 100 feet above the roadway.

How Hi Sibley Views the Gasoline Trail in Mexico


PACKARD TRAINS LIKE PRAIRIE SCHOONERS OF OLD.
SIR?
GREAT RIVALRY BETWEEN THE TRUCK COMPANIES.
DON'T INSULT A CHAUFFEUR OF THE BLINK COMPANY BY ASKING HIM IF HE IS A MEMBER OF THE BLANK, OR VICE VERSA.
PING!
SPAT!
BESCO STEEL WHEELS ON JEFFERY QUADS MAKE EXCELLENT SHIELDS IN CASE OF ATTACK
THE BIG 4 TON PEERLESS TOWERS ABOVE MAJOR SAMPLE'S HEADQUARTERS LIKE A BATTLESHIP BESIDE A BUOY.
THE PRINCIPAL HIGHWAY MARKER.
MERELY A MIRAGE
THE WATER WAGONS ARE BUSIER NOW THAN THEY EVER WERE ON NEW YEAR'S
WELL, I'VE STAID ON 32 HOURS THIS TRIP, ANYWAY
AQUA PURA
HEY, RETARD YOUR SPARK!
Hi Sibley— COLUMBUS N. M. APRIL-1916
SOME OF THE TRANSPORTS HAVE HALF A SPEED AHEAD AND ABOUT SIXTEEN REVERSE.
THE CLINTONVILLE —

Training War-Truck Drivers at United States Army Post

Venturesome Civilians Respond to Call for Military Chauffeurs and Some Hold Steering Wheel for First Time

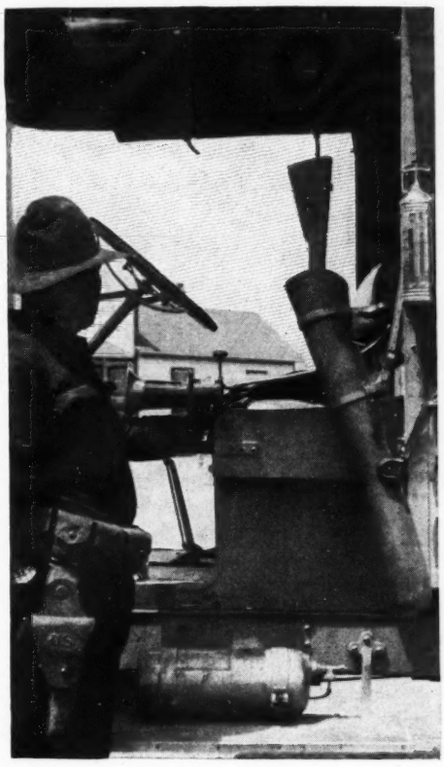
COLUMBUS, N. M., April 15—Delayed—With new motor truck squadrons being rushed from the factory to the military base at Columbus almost before one can blink, the task of keeping on hand a fresh supply of chauffeurs is no small one. Yesterday there were 200 motor trucks in operation on the line of communication to the advanced front; today that number was increased by 74. They came in one solid trainload last night.

The practice of recruiting military chauffeurs in the factory cities has been discontinued. A chauffeur is no longer a part of the regular equipment of the transport trucks and therefore the quartermaster's department must step lively to supply them. But they were not caught unprepared. Even as the trucks were being unloaded from the cars seventy-four green drivers were being given their first driving lessons. True, a great many of them were experienced men, but some had never held a wheel nor shifted gears in their lives. One in particular admitted he knew nothing about motor cars, but he "reckoned" he could tackle it all right because he had been a saw mill engineer for 10 years. The majority expressed equal confidence.

What Is the Lure?

These incipient chauffeurs were recruited in San Antonio and El Paso, and contracted to enter service as civilian drivers for a period not to exceed 6 months at $75 per month, and keep. Uniforms, blankets and gun—a formidable .45 caliber army automatic—are furnished by the government. It is a question whether the lure of adventure or the salary draws most of them to this war, but in either case, the average accepted in the number given examination was high.

Owing to the urgency of getting the trucks into service, the new men could not be given a prolonged test, but under the skillful tutelage of the older drivers, they were worked into shape in record time. They were lined up on one side of the camp motor row and as Captain Furlough called off their names each was promptly assigned to a waiting truck in charge of one of the regular drivers.



Leather rifle socket on White and Pyrene fire extinguisher

By Hi Sibley

After preliminary instruction in clutch action, gear selection and the position of spark and throttle, the neophyte took the wheel and away they went—sometimes almost too abruptly—and another truck pulled up for the next man. When they returned the instructor would report to Captain Furlough the performance of his particular charge.

Sometimes it would be "He's a crackerjack!" and again a dubious "Don't think that chap will do; he's all thumbs." One applicant was rejected because his legs were too short to manipulate the pedals properly.

As reports were turned in each man's performance was checked after his name, as "rejected," "fair" and an occasional "very good." There were five of these last, and they were reserved for a picked team to replace men transferred to more important positions.

This crew of new drivers will go out as soon as cars are prepared and loaded. Motor truck representatives on the field are skeptical about sending out these inexperienced men with new trucks, and it is true that some of the cars have suffered acutely in the region of their transmissions, but the captains in charge have confidence in turning out a first-class set of drivers in a short time, and are making the best of it.

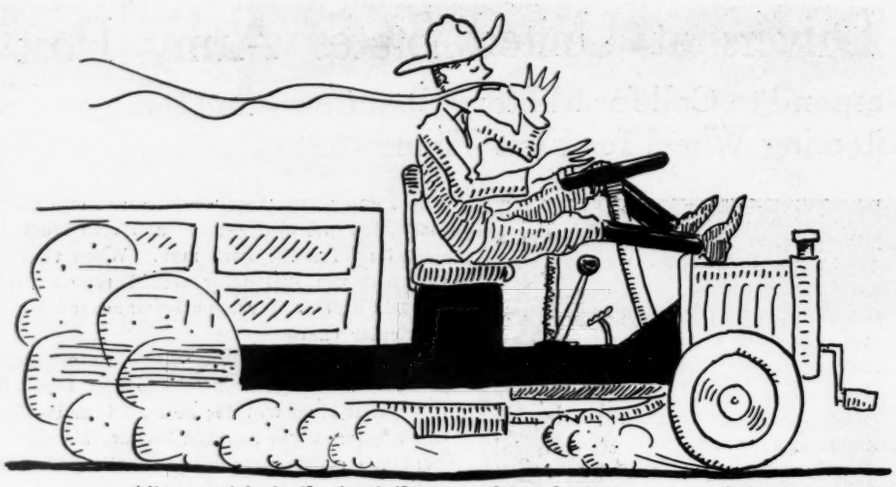
Chauffeurs Improve

An officer admitted that in camp some of the recruit chauffeurs might give the impression of lacking in discipline, but said that one crew he had in charge had given an excellent account of themselves after a short period of training.

"They are a mighty good lot of boys," he said; "all they need is an opportunity to make good, and someone to show them how to do it."

The factory crews who came with the first trucks and stood by them are doing exceptionally well. In particular the first Packard crew is giving a splendid account

Jeffery quads bound for the San Antonio, Mex., base transporting troops and supplies. Making up the train at the camp of the American field headquarters, near Namiquipa



After one trip to the front the green driver becomes very nonchalant

of itself, individually and collectively. Truckmaster Carl W. Newell reports every car running on schedule and so far he has lost only one man. The driver reported missing was lost—not by bullets—by carbuncles.

This is the crew that came from the shops in Detroit to El Paso in 51 hours. Truckmaster T. H. Parramore, of White Company No. 2, has had equal success. Mr. Parramore is an old hand at this sort of thing, having established a motor bus line in Bolivia, and made a trip in a White truck from Valdez to Fairbanks, Alaska, for the U. S. Border Road Commission, so the experience is not new to him.

In spite of the rumors of that elusive disturber, Pancho Villa, being wounded; headed south, east, west; dead, hiding in El Paso, hiding in Mexico City, held prisoner by Carranza (?), and a thousand and one other things that could happen to him, but don't—in spite of all that, activities in the motor transport line increase daily.

Exclusive of the post trucks, used in camp only, there are 285 trucks in operation along the 300-mile line of communication. These include five companies of Jeffery quads, three companies of White trucks and two of Packards. Each company comprises twenty-seven cars. Then there are two Locomobiles of 3-ton capacity, seven White tank trucks and three Clintonville—Four-Wheel Drive Auto Co.—water-tank trucks.

The post trucks include White, Lippard-Stewart, Velie and Republic, and in addition to these are Dodge and Ford touring cars in use by officers, Ford ambulances and an ever increasing family of the prolific motorcycle. The problem of keeping all these yawning maws provided with fuel is a gigantic one, and every week sees an addition in the number of reserve gasoline tanks installed and the tank cars on the spur from the railroad main line.

Mexico's Gas Output Is Large

Survey of the Situation at Other Points

TAMPICO, Mex., April 28—Notwithstanding the prevailing impression which seems to exist in motor car and industrial circles of the United States that the crude oil of the Tampico region is the source of a very small supply of gasoline, the present output of the refineries here and the one at Minatitlan. on the Isthmus of Tehuantepec, aggregates more than 2,000,000 barrels of gasoline per annum.

It is expected that enlargements now being planned will increase the capacity to 5,000,000 barrels per annum. The gasoline output of the Mexican Petroleum Co., Tampico, will soon be increased to approximately 1,100,000 barrels per year.

The plant of the Pierce Oil Corp. will be enlarged also during the year if political conditions of the country become more settled. The Lord Cowdray interests, operating under the names of the Eagle Oil company and S. Pearson & Son, Ltd., plan extension also. Two or more new refineries of large capacity are in prospect.

PREDICTS LOWER FUEL PRICES

New York, April 28—The researches of the United Motor Fuel Corp., which was organized lately to produce low-cost gasoline, points to the conclusion that the future has in store an abundant supply of motor fuel at prices lower than those prevailing, according to the information gathered during the last month.

Three further conclusions are given: First, that no process now in common use does all that can be done in the production of gasoline; second, that no process except the Burton is as yet a demonstrated economical commercial success; third, that at least two processes, now in their infancy, will eventually develop into important factors in price reduction.

GASOLINE RISES 2 CENTS IN TEXAS

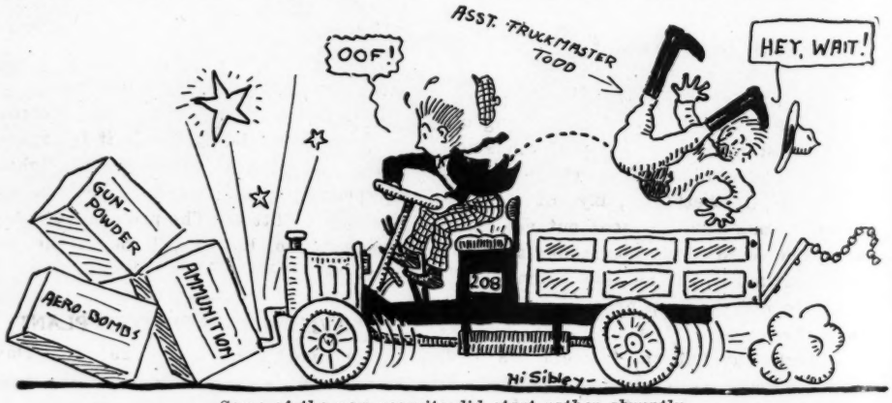
Austin, Texas, April 28—Gasoline is now retailing at 24 cents per gallon at Austin and neighboring Texas cities, which is a rise of 2 cents. The advance was not made simultaneously by all the dealers, as was the custom before the state attorney general began his investigation of the alleged combine to fix and regulate prices in restraint of trade. It was several days before all of the dealers had raised the price to 24 cents.

According to information that is in the hands of the attorney general of Texas there has been a general increase in oil production in the different fields of Texas and in Oklahoma, with the exception of perhaps two districts in recent months. It has been reported from time to time for several weeks that Attorney General B. F. Looney was about ready to file suits against certain oil refining and distributing concerns for alleged violations of the anti-trust laws but up to this time the prospective litigation has not developed.

MAINE FIGHTING HIGH GASOLINE

Portland, Me., April 29—Maine dealers are being asked to take a hand in the fight against the gasoline problem in this state. The Portland Automobile Dealers' Association has sent out a letter to the dealers all through the state asking for assistance in which it says:

"The price of gasoline is getting to be a serious problem to all those interested in the industry. It not only affects the manufacturer and the dealer, but materially affects the owner and the garage man. It



Some of the new recruits did start rather abruptly

is evident that the large oil companies are manipulating the gasoline, and unless something is done, and that without delay, there will be stagnation in the industry throughout the United States.

"In order to relieve the situation and get something started, and to coöperate with other associations throughout the country, the Portland Automobile Dealers' Association has addressed to several senators and representatives in Washington, a letter asking them to take such action and support any measure which may tend to relieve the present situation."

Replies have been received from the dealers at Lewiston, Auburn, Bangor and other Maine cities pledging assistance, and it is expected some definite action may result that will lower the price in the state.

MANY WESTERN MOTORISTS IN EAST

Los Angeles, Cal., April 28—The East is already receiving motor tourists from the West in great numbers. According to a report issued by the touring information bureau of the Automobile Club of Southern California, touring from the West has increased 1,000 per cent. For the past three weeks an average of thirteen inquiries have been received daily at the club's headquarters. Many transcontinental parties leave without giving the organization a chance to make a record of the departure.

The fact that many California, Oregon, Washington and Arizona motorists are touring in the East does not mean that there has been any decrease in the number of visitors coming in motor cars across the continent to visit California. In 1915 there were 2,137 motoring parties from Eastern states who registered at Springerville, Ariz. It was impossible to get all the tourists who crossed the national Old Trails route.

JULY 4 A DAY FOR MOTORISTS

Washington, D. C., April 28—Again in 1916 every motorist will be urged to take to the highway on July 4, and during the week of Independence day, as in 1915, when the American Automobile Association and the National Automobile Chamber of Commerce cooperated in accelerating the motor mileage by efforts among clubs and owners' organizations to make the mileage of that week the maximum of the summer.

SECURE DIXIE ROUTE MARKERS

Chattanooga, Tenn., April 28—One of the first divisions of the Dixie highway to arrange for a special road marking day is the western division between Louisville, Ky., and Nashville, Tenn. President D. W. Rider, of Elizabethtown, Ky., of the divisional association, has sent out notices to all of the counties on his division to secure their markers from the association and be ready to put them up on June 1, in order that the close of the day set apart for this work may find the entire Dixie highway between the cities mentioned thoroughly marked.

EZRA MEEKER, transcontinental traveler, left Washington, D. C., April 28 on a cross-country trip in his schoonermobile bound to Olympia, Wash., a distance of 3,560 miles. Mr. Meeker, who is 85 years old, has made three trips across the Oregon trail by ox team. The object of the journey is explained by signs which decorate the vehicle.

To retrace the Cumberland road and the Oregon trail and to report to Congress conditions and the probable cost of building a national transcontinental military highway is the object.

The schoonermobile is equipped with all the comforts dear to the heart of the overland pioneers of a by-gone generation.

Current Happenings in the Field

Murray Eight Is Announced— Davis Gets Plant

PITTSBURGH, Pa., April 25—The Murray Motor Car Co. has been organized to manufacture the Murray touring car, to be an eight-cylinder design with seven-passenger accommodation with 127-inch wheelbase for car and roadster types. W. B. Murray, who has been connected with the Packard distribution in Pittsburgh, is president. Associated with him are J. W. Pontefract and W. W. Bensel, also associated with him as Packard dealer. Fred Berger is chief engineer and Joseph Gardham is production manager. A factory has been secured at 3700 Grand boulevard and materials have been contracted for.

The car will be largely an assembled one, using a unit power plant composed of an eight-cylinder Herschell-Spillman motor 3.25 by 5, and a Covert gearset. Other parts used are Timken axles, Perfection springs, Parish & Bingham frame, Gemmer steering gear, and Blood universals. At this time it is not definite what electrical equipment will be used, but it is expected that Westinghouse starting and lighting equipment will be standard. Bosch ignition will be fitted. The price has not been decided upon, but it will be in the zone of $2,000.

DAVIS GETS WESCOTT PLANT

Richmond, Ind., April 29—The Davis Motor Car Co. has taken over the entire plant of its neighbor manufacturer, the Wescott Motor Car Co., and will occupy it July 1.

For 2 years Davis has been looking for more space and by such an arrangement has increased to 125,000 square feet with the old and new plant combined. Many important changes will be made in the factory equipment by adding tools and machinery and by employing more workmen, which means that the future activities will more than equal the combined business of the two companies heretofore.

LOCOMOBILE FINANCIAL STATEMENT

Boston, Mass., April 26—The Locomobile Co. of America has filed with the Massachusetts Secretary of State a statement of its financial conditions, dated March 31, 1916, which compares as follows:

ASSETS.

	1916	1915
Real estate	$ 186,500	$ 186,500
Machinery	2,452,697	2,029,527
Merchandise, material, stock in process	4,148,055	4,235,684
Cash and debts receivable	830,554	1,049,014
Patent rights, trademarks and good will	5,515,952	5,310,793
Sundries	206,921	203,511
Total	$13,340,681	$13,015,031

LIABILITIES

Capital stock	$ 6,250,800	$ 6,250,800
Accounts payable	317,673	397,426
Funded debt	2,018,500	1,176,000
Floating debt	2,775,681	2,789,448
Reserves	670,437	559,469
Profit and loss surplus.	1,307,589	841,886
Total	$13,340,681	$13,015,031

No Starters Wanted by Motorists Ten Years Ago

J. B. Entz Tells of Fitting Electric Cranking Feature in His Transmission and Later Discarding It—Explains Owen Magnetic Principle

INDIANAPOLIS, April 28—Electric starters were tried out on motor cars over 10 years ago and discarded on account of lack of demand. This unexpected statement was made by Justice P. Entz, the inventor of the Entz transmission, in the discussion of a paper presented by him to the Indiana Section of Society of Automobile Engineers tonight. He said that in 1906, when the first Columbia cars appeared with his electric transmission system, they incorporated the electric starting feature and were so exhibited at the New York show in 1907, shortly before the company failed. On account of the very much higher quality of the fuel in those days, which was more easily ignited, and the universal use of battery ignition, it was possible to start on the spark most of the time and starting systems of any sort were not considered necessary, consequently the starting feature was discarded temporarily.

Tests of Owen

Preliminary to the presentation of the paper some tests on the Owen Magnetic equipped with the Entz transmission and driven by R. M. Owen, president of the original Owen company, were run on the Indianapolis speedway by the research committee of the Indianapolis section S. A. E., and under Charles P. Grimes, of the National company and Chester Ricker, of the Stutz company. These tests were made to determine the current required at different speeds and also acceleration and deceleration tests from which the drawbar pull and horsepower used to propel the car were calculated. It was shown that at a car speed of 10 miles per hour the current was 35 amperes, at 15 it was 35 amperes, and from that speed to 50 miles per hour, increased gradually to 77.5 amperes. The drawbar pull was shown to vary from 69.9 at approximately 20 miles per hour to 109.6 at a speed between 30 and 40. Acceleration figures gave 4.3 seconds from standstill to 10 miles per hour, 3.8 from 10 to 20, 7.1 from 20 to 30, and 11.9 from 30 to 40.

This was followed by a presentation of a paper in the evening by Justice B. Entz before 200 members of the section. This paper was entitled The Electric Transmission on Owen Magnetic Cars and gave in brief the design and operation of this transmission, together with a presentation of its advantages. Inasmuch as the subject matter of the paper was more for the purpose of bringing out discussion and has been published in somewhat slightly different form in Motor Age, in earlier issues, a brief summary of the paper, bringing out the principle will be sufficient.

In place of the flywheel, clutch, gearset, starting and lighting system and their auxiliary parts, there has been substituted two direct-current dynamo machines and a drum controller. One of the dynamo machines has its field magnet frame directly connected to the engine crankshaft taking the place of the ordinary flywheel. The armature of this machine is mounted on a large hollow shaft, which is directly connected to the propeller shaft. This machine is called the clutch generator, as it acts both as a clutch and a generator. The second dynamo machine has its armature mounted on the same hollow shaft as the first, and its field magnets are stationary; it is called the motor, as it is generally used as a motor to help drive the propeller shaft, and boost the effort of the engine as transmitted through the clutch generator, which, like any clutch, can only transmit the engine effort or torque.

The clutch generator is used as a clutch alone, on the high speed, when it is short circuited upon itself, and a small speed difference between armature and field, or a small slip is necessary to establish the current in its windings which energizes it, and causes it to act as a clutch. On the high-speed position the motor plays no part in the transmission of power, but is used on a charging generator for the storage battery, which latter is used for cranking the engine and for the electric lights.

On all other power control positions, but the high, the motor helps turn the propeller shaft, by taking current from the clutch generator in whose circuit it is included. At these times the slip in the clutch generator is greater than needed to energize it as a clutch, and the additional slip produces the current required for the motor, which it utilizes for giving additional turning effort to the propeller shaft.

Graduation of Speed

The different graduation of speed and torque are controlled by the relative strength of the generator and motor fields. The weaker the generator field compared to the motor field the greater the slip and the more electrical energy goes to the motor for producing greater torque.

Besides the positions of power control there is a neutral position which the clutching effect is cut out, but the motor is so connected through a resistance as to act as an electric brake, in which case it becomes a generator, taking power to drive it, and so braking the car. This brake is most effective when the speed is highest and is ineffective below 15 miles per hour; it will hold the car on any mountain grade to 20 miles per hour without wear of any parts and can be applied with the car going 60 miles per hour. It cannot hold the wheels and there is little danger of skidding, as the braking effort disappears at speeds below fifteen miles per hour.

Outside of the simplicity of the system and the fact that it displaces complicated and objectionable parts of the prevailing type of motor car, there are features that appeal to those that drive and ride.

In the first place all power impulses of the gas engine are eliminated, and the turning effort impressed on the propeller shaft is as uniform and smooth as that from an electric motor; in fact, it is exactly the same. No jars or shocks can be transmitted through the elastic means of transmitting the engine power, as there is no mechanical connection at all between the engine and driving shaft.

No Disconnection of Power

In the second place, from the time of starting the car from a standstill until maximum speed is reached and through all the range of power required from level road to the worst hills, the power between the engine and propeller shaft is never disconnected, as is the case where clutch is thrown out, a gear change made and clutch engaged again. This is all controlled by the small lever on top of the steering wheel and allows the car to be manipulated in traffic and on winding, irregular grades in a way to call forth all the power of the engine at just the instant and for just as long as it is needed. The car can be held on a grade by its engine power, the clutch generator slipping and holding with the aid of the electric motor, ready at once to go forward upon opening the throttle or by closing the throttle slightly, the car be allowed to back, then held, then forward again, and then up to the maximum speed the grade allows; all without disconnecting the power of the engine from the driving shaft.

From a standstill with the engine idling, the car can be smoothly and rapidly brought up to the speed of traffic in cities, 20 to 25 miles per hour without a jar or jerk. Acceleration is so smooth as to seem less rapid than it really is, and it is accomplished without any previous speeding up of engine before dropping in of clutch and gear changes made at high engine speed, as is the case when a rapid get-away is made in a geared transmission car.

Another feature is the coasting of the car upon closing the throttle, the principle of operation of the clutch generator is that it will only clutch when the engine is running faster than the driving shaft, so upon closing the throttle the car coasts or drifts perfectly freely, with the engine idling.

Chairman F. E. Moskovitz, Nordyke & Marmon, opened the discussion by reading a letter from David E. Gallup, of Worces-

ter Polytechnic Institute, chairman Research Division of the Standards Committee of the parent society, asked a number of questions as to the efficiency and torque of the transmission system. In reply, Mr. Entz stated that the efficiency was very high, that the apparatus is similar to a dynomometer in which the losses must be minimum. The only speed difference is that due to the losses and according to tests made by the General Electric Co., the transmission is without loss at the point of maximum torque of the engine. On ordinary level road work, the torque required calls for a slippage of about 55 revolutions per minute. By that is meant that the crankshaft of the engine revolves about 55 r. p. m. faster than does the propeller shaft. At the point of maximum torque, it called for a slippage of 92 r. p. m., but this speed loss is a help at times as it permits a higher engine speed and thus greater power development when the pull should be greatest. On hills the car does not run more slowly on account of engine slip, but the engine runs more rapidly, thus developing greater horsepower and torque. The principle is the same as slipping the clutch in the conventional type of car with the difference that instead of the energy due to the slip being used up in the form of heat in the clutch, which in time will destroy it, the energy thus generated in the electrical transmission by this slippage is used in the motor portion of the electric machine to boost the driving effort.

High Efficiency

Up to the point where the engine runs to the speed of maximum torque more power is developed than in the conventional type and the efficiency at 1,000 r. p. m. of the engine is 93 per cent.

There can be no loss in friction, the only loss is in speed and that is not so much a lower car speed as a higher engine speed.

In the matter of economy, Mr. Entz stated that parallel tests using cars similar in every respect except the transmission, showed better economy of fuel with the electric transmission. This is due chiefly to the saving effected in coasting.

Asked as to a surging effect at certain speeds, Mr. Entz said that this was a matter of expertness of the driver, that because of the complete mechanical disconnection between engine and propeller shaft and the cushioning effect of the magnetic clutch, no inequalities of engine running could be transmitted to the rear axle nor could the road surface cause uneven engine running. If the car were drifting and the controller handle placed in the wrong place, there might be a slight surging effect.

Asked by R. W. Knowles, of the Milburn Wagon Co., as to the amount of added weight and cost in a car equipped with the Entz transmission, and also if it were possible to employ an electrical method for reversing instead of the gear reverse employed in the Owen, Mr. Entz stated that electrical reversing mechanism could be employed but the mechanical method gives all the speeds in reverse.

As to the difference in weight, there is practically no difference. In some installations the weight has run a little higher for the electric and in others it has run a little lower. The price question is a question of quantity production, but the electric system has the advantage of providing directly a method of running in the engine by using the electrical apparatus on the car and shop current, also providing a direct dynomometer test. It has been found that the complete apparatus can be assembled in 2½ hours on the bench.

Objections Stated

Guy B. Wall, Chief Engineer, National Motor Vehicle Co., stated that to adopt the system it would be necessary to give up a thoroughly trustworthy and satisfactory apparatus, the present gear transmission and friction clutch, and suggested that it would be interesting to make some experiments in driving cars under tests such as those performed today on the speedway, first with the electrical transmission and then with the gear transmission and friction clutch substituted.

He also thought there was an advantage in the conventional type of drive in being able to use the momentum of the flywheel in getting out of a hole. The effect with the electric transmission would be like using a lead hammer instead of a hard steel hammer; with the same energy applied the effect would be considerably different.

Mr. Wall asked what changes had been made in the system during the past 2 years, to which Mr. Entz replied that there had been no changes in that time.

Asked as to whether the drag of the electric motor was perceptible at high speed, as has been charged against the electrical starting and lighting apparatus, Mr. Entz stated that the drag in charging the battery is considerably less than that of most lighting generators on cars today, because the small size of those units prevented their efficiency being high. In regard to pulling out of a hole, Mr. Entz said that the transmission would handle the maximum torque of the engine, which is all any transmission can do, and that the maximum draw bar pull with the Entz system can be obtained even with the car at a standstill.

George W. Weidely, of the Weidely Motors Co., reported on some comparative tests he had made of the Entz transmission, stating that a year ago last September he drove a car from New York to Indianapolis with the conventional gearset transmission and Ray Owen drove another car which was a duplicate in every respect except it had the Entz transmission. In order to make sure that conditions were identical throughout the run, the drivers were interchanged at times, and when one shield went up or down both went up or down, tops were put and down at the same time, and so on. They covered 1,059 miles in 39 hours, all but 6 of which hours were in rain. The geared car weighed 42 pounds less than the electrical equipped car.

On level roads there could be noticed no difference in speed capability. On most hills, the electrical equipped car could run away from the gear driven car on account of its ability to change the gear ratio to suit the hill. There was so little difference in the ability on the road that it was not measurable. Both cars obtained a speed of 64 miles an hour. As to fuel economy, Mr. Weidely stated that there was so little difference in the figures of the fuel consumption for the run that had they been interchanged it would be impossible to tell which was which.

Mr. Combs, manager of traffic department of Prest-O-Lite company and secretary of the section, asked as to the current and voltage in the system, to which Mr. Entz replied that current depended upon the torque and the voltage depended upon the slip and torque.

Asked by Darwin S. Hatch, editor Motor Age, as to the possibilities of eliminating slippage completely at high speeds by the introduction of a friction method of clutching by centrifugal or other means, similar to that which has been suggested by another company, Mr. Entz stated that it was his belief that he suggested it originally a good many years ago, in the form of a centrifugally operated mechanism, but found it necessary to discard the system because with it the smoothness and cushioning effect was lost. He said it was the endeavor to eliminate the possibilities of wear in the transmission and as proof that the purely electric transmission is free from wear, cited the old Columbias which were made in 1907, nine years ago; all turned out are still running and the electrical transmission has never been touched or even oiled.

Demand for High Gear

G. P. Dorris, Dorris Motor Car Co., considered that in the present condition of the motor car industry the demand was for abnormal power and all high-gear work and asked as to the possibility of using the two-speed gearset in conjunction with the electric transmission in order to get flexibility. In reply, Mr. Entz stated that they had built some with two-speed gearsets of this sort which gave double the number of speed changes possible with the direct drive only.

Mr. Cornell, of the Perfection Heater Co., stated that the general criticism he had heard of the Entz type was the fuel consumption, to which Mr. Entz replied that the electric system is more efficient on account of its coasting ability and the variation of gear ratio to the road conditions. No criticism was ever made by owners as to either the hill climbing power, acceleration or economy. The maximum

permissible torque is anything desired, as in a geared car.

There is a 5-ton White truck now with Entz equipment and a number of other trucks running in express service. R. M. Owen, president of the Owen company, stated that they now are making a number of installations of different motors for test purposes, among which is a Weidely twelve, and said that the company would be willing to send the car to Indianapolis for the use of making a test in comparison with one of the standard cars with Weidely's motor.

Mr. Entz stated that he started on his transmission system 18 years ago and has one which has run 200,000 miles without ever being opened.

Professor Veyl, of Purdue University, suggested that the system should be particularly suited for trucks, to which Chairman Muskovics replied that he saw a demonstration of an Entz-equipped truck in which the wheels were lifted over a 6 by 6 timber from a standstill on the throttle alone.

R. M. Owen explained that they realized the possibilities of the truck field, but up to the present had preferred to develop the passenger car end, although they expect definite data on cost of operation and maintenance in about 2 months from a number of trucks they have had in service for some time.

MOTORISTS ALWAYS RESPONSIBLE

Detroit, May 1—Police Commissioner Gillespie has come out with an edict that is new to the regulation of traffic in this country. Due to the great number of traffic accidents in this city, in which pedestrians have figured, the commissioner holds that hereafter the driver of a car is responsible for accident to foot traffic under any conditions—that is, even though a pedestrian carelessly backs into the street and gets run down, or if someone drops apparently from nowhere in the path of the car and gets hurt, or for any other similar circumstance which heretofore has been regarded as no fault of the car driver, the latter henceforth will be held responsible and, according to the Gillespie edict, will have to go to jail.

Blames Standard Oil

Minnesota Association Asserts that Trust Practices Keep Fuel Price High

Report to Washington Protests Relations of Subsidiaries

MINNEAPOLIS, Minn., April 29—The Standard Oil Co. is portrayed in the role of a trust engaged in holding the prices of gasoline at levels unwarranted by conditions, in a report issued with the sanction of the Minnesota State Automobile Association, dealing with the problem of fuel supply and prices. It has been prepared by G. A. Will, special representative of the association at Washington, following the investigation begun in Minneapolis by the city council, the Minneapolis Automobile Trade Association and the motor clubs of the Twin Cities. He presents six conclusions and says in part:

It is apparent the various Standard Oil companies are working in harmony and that there is no competition between them; that the decree of dissolution of the Standard Oil Co. of New Jersey, if anything, legalized the trust conditions and common ownership of the various companies as they existed previous to the incorporation of the latter.

That there is no present shortage of crude oil. The reserve stock of both oil and gasoline was larger on January 1, 1916, than on January 1, 1915, yet the price of gasoline has doubled and of crude oil more than quadrupled

That while the volume of gasoline has increased materially the last year or two, this does not justify the increased cost.

That the present price of gasoline is altogether disproportionate to the cost of production is known by the fact that the various Standard Oil companies beside declaring legitimate dividend have declared an extra dividend of 100 per cent and in some instances have materially increased their capital stock.

Gasoline is being sold in the Twin Cities by the independents at 20½ cents and by the Standard at 19½ cents. The price has remained unchanged in the Minneapolis territory for several weeks.

ENTERS TIRE FIELD

Muskegon, Mich., April 28—The Brunswick-Balke-Collender Co., maker of billiard tables, bowling alley fixtures and equipment, among many other products, is going to enter the tire manufacturing field and has ordered tire manufacturing machinery, which will be here within 2 months, it is said. The Brunswick concern will enter the tire field well equipped for such production, since careful investigation and canvass of the field was made before launching on the new tack. At the start from 50 to 100 tires a day are to be turned out, but within 12 months it is expected that the daily output will be in the neighborhood of 1,200 to 1,400 tires. Immediate addition of 100 men to the present 1,200 working force at the factories of the concern here will result from the taking on of this new manufacturing activity, and within a year it is expected that the added force will be 800. Present plants will take care of the tire business, but very likely additions will be necessary later.

COLLINS TO LEAVE BUICK

Flint, Mich., April 28—R. H. Collins, well known in motor car circles as general sales manager of the Buick Motor Co., will, on July 31, sever his active connection with the Buick organization. No announcement of future plans has been made by Mr. Collins, and it is not yet known who will succeed him in the sales work of the Buick organization. With Mr. Collins' retirement the industry will lose one of its pioneer selling figures, as he has been with the industry many years.

PLAN MOTOR PARADE

Tacoma, Wash., April 29—Much interest is being shown in the big motor parade which will be an attraction at the Memorial Day events at the Tacoma speedway. This parade will be the only one of its kind ever held in the country and undoubtedly other speedways will take the idea up and hold similar events later in the year.

The long line of machines will start at the east end of the grandstand and parade around the track and fill the course for its entire length, thus making 2 miles of new machines in one continuous stream, and as each car passes the stand spectators can see the make of car, price, etc., on pennants which will be carried by each machine entered in the parade.

Fashions for Men and Women Who Motor

Up-to-the-Minute Styles for Late Spring Wear

A WIDE variety of colors are found in men's and women's outer garments for late spring and early summer wear. Sport coats for women are made in green and white wool velour, tweeds, stripes and only a few are very conservative as to variety of shades. For n is true of women's wear, butmen there is less of a variety tha grays, greens, plaids, etc., prevail.

Men's coats are shown with rubberized cloth on one side and gabardine on the other. Sometimes leather—French calfskin—takes the place of the rubberized cloth in connection with gabardine. Marshall Field & Co., Chicago, is showing a special ventilated coat for men under the name, "Aervento." This has a series of ventilating valves along the folds in the back which carry away the body heat and make for the comfort of the wearer, at the same time protecting him for storms. Storm coats for men and women, in oiled silk, vary little in style.

Patch pockets are popular as are large belts and full back and skirts. Marshall Field & Co. is showing a special shirt for men, which slips on over the head. It is made of oiled silk, may be folded to go into a small place and is a good protection for the clothing from dirt or rain. The cuffs are elastic and the garment comes well below the knees. One of these garments is shown in the group illustration on the opposite page.

Misses' suit of blue gabardine, with belt and cuff straps of gunmetal. Bonwit, Teller & Co., New York

Tweed knock-about coat on mannish lines. Price, $17.50

Wool velour sport coat which may be closed at the neck. The bottom is full flared. Bonwit, Teller & Co., New York

On the farther side of the car is shown a double texture, rubberized ventilated raincoat with convertible collar bearing the name "Aervento." Ladies' and men's oiled silk and storm coats of transparent material are shown on the first two persons in front. Next lady is wearing a black and white tweed motoring coat belted from sides and having large patch pockets and very loose back. The next is the gabardine side of the reversible French calf garment. At the extreme right is a rubber shirt which slips over the head. Marshall Field & Co., Chicago

The two views show the roominess to be found in some of the smartest models of coats for this year

Sport hat of silk poplin in old rose and blue, green and white, blue and white and black and white. Price, $4.50

All clothing not otherwise credited is by the Auto Supply Co., New York

Photos of Auto Supply Co.'s garments by Lazernick, New York

Left—A distinctly novel sport hat. Bonwit, Teller & Co., New York

Right — Two views of green and white wool velour sport coat. Green leather belt and seven box plaits on each side. Price, $25

Tires, Their Care and Repair—Part V

How to Increase the Mileage — Attention to Small Cuts, Driving Methods and Looking After Tubes Are Important

Herewith is printed the fifth installment of a series on the care and repair of tires, the first of which appeared in the April 6th issue of Motor Age. The present installment explains in detail the proper methods of caring for the small cuts that come on tire casings when vulcanizing is not resorted to; also things to watch in driving and in storing and inserting tubes.

THE tire manufacturers, who have contributed the essential facts on the care and repair of tires for the series of articles on this subject in Motor Age, have set forth the causes of excessive wear, the manner of preventing such damage, and the proper steps to follow in performing repairs. The present article, dealing as it does with the matter of small cuts and bruises and general care, might rather be regarded as a composite statement from tire manufacturers on how mileage may be increased to the maximum.

The car owner invests an indefinite sum of money in a tire. For value received he is given a product of unusually delicate construction. Nature, the laboratory and factory unite in the making of an article that finally arrives on the market with a price tag upon it, which presumably bears a direct relation to the wear and service which may be expected from it. The manufacturer has done his part in the transaction by providing a good tire, and it is safe to say that the existing competition does not permit of the manufacturer failing on his end of the bargain by offering an inferior tire. On the whole, tires come up well to the standard which has been developed in that branch of the motor car business.

Sale Does Not Complete Transaction

The purchasing of a tire at a stated price, however, does not complete the transaction. The new owner of the tire has paid the price. He has yet to fulfil the other obligation, for such it is, of seeing to it that the tire shall not be subjected to neglect and abuse. It rests with him to get results. The conditions under which tires give the most mileage may be known easily by every car owner. It is not necessary that he himself be expert in repairing cuts and bruises and vulcanizing unless he undertakes to do his own repairs, nor is it required that he possess the scientific knowledge which the manufacturer must have.

Three words—care yields mileage—contain the alpha and omega of the tire science necessary to the car owner in living up to the second obligation which devolves upon him in the purchase of the tire. In the second article of this series, which appeared in Motor Age of April 13, the two most common causes for the failure of tires to give the best results and maximum mileage were shown to be under-inflation and neglect of small cuts in the tread. The question of inflation was dealt with in the previous article. Now we are concerned with the latter of these two important essentials of tire maintenance.

All manufacturers of tires supply or recommend some form of mastic or cement for mending small cuts in the tread. These compounds if applied when the cut is new and has not begun to enlarge will lengthen the life of the tire perhaps more than any other one factor if the tire does not suffer from abuse of another sort. A close relation exists between this attention to the cuts from minor causes, such as glass and tacks and proper inflation. This fact is apparent when one considers what is the action of sand and moisture in an open cut.

Lengthening Tire Life

CAREFUL DRIVING

First—Avoid ruts as much as possible. They affect the side walls of the tire, since the rubber at this place is considerably thinner and less wear-resisting than on the tread, it will soon be worn through to the fabric. After this happens, the fabric is exposed and is likely to deteriorate very rapidly.

Second—When brakes are applied too suddenly and the wheels locked, the car will often continue in motion with the result that either one or both of the rear wheels slide. Since rubber is considerably softer and more yielding than the road surface, the result of this sliding will be noticed on the tread of the tire because the sliding along the ground will generally scrape off part of the tread rubber.

Third—Car-track riding shortens the life of the tires because of the constant chafing that takes place between the upper part of the rail and the tire. It should be avoided at all times.

Fourth—If you notice one of the front tires beginning to wear down exceedingly fast, it is well to have the wheels measured up for proper alignment immediately.

If the two front wheels do not run exactly parallel, one of them is always subject to a drag or a diagonal grind which soon wears down the tread excessively.

THE CARE OF TUBES

The principal thing to watch about tubes is the application. Whenever you insert a tube in a casing be sure that there are no wrinkles in it. The best way to do this is to inflate the tube slightly so that all the wrinkles will be taken up before it is applied into the casing.

There is always a certain amount of heat generated between the casing and the tube. To take care of this heat it is customary to apply a light coat of talc to the tube before it is inserted into the tire. This coating of talc, however, should be light. Whenever it becomes too thick, it has a detrimental effect on the tube.

THE CARE OF RIMS

It is a good idea to keep the rims of the tires as free as possible from all rust because rust will affect the tube. To do this, it is only necessary once in about every 6 months to remove the tires and tubes and to clean the rims with a wire brush. After that has been done, it is a good plan to coat the rims with graphite. Of course, this means considerable work. However, it is bound to help prolong the life of the tire.

The sand grinds the rubber and the moisture weakens and rots it. Under some conditions sand is almost equal to emery dust in cutting quality. The minute articles of silica picked up by the tire, for instance, on a newly surfaced road on which gravel has been used and still is grinding under the weight of passing vehicles until a dust-like covering of fine sand lays over it, after working its way into a cut in the tire will produce more damage than a coarser sand which has been weathered. Sand in itself will increase the tendency of moisture to accumulate within the injured section of the tread.

Not a long time must elapse until a small cut will spread and extend through the tread to the fabric. When this occurs the tire has been so seriously impaired that its mileage record surely must fall below what it might be otherwise. The services of a repairman sooner or later will be required if the cut is left unattended.

The tire user therefore does not complete the transaction of buying the tire simply by paying the price. A further investment of care and attention must come subsequent to the first or cash investment. If miles are counted it may be found that this is more important in the economy of tires than the question of dollars and cents.

Useful Tire Hints Given

Hints are given by all the companies on how to follow the road so that little injuries and unnecessary strains on the tires will be avoided. Careless driving is as detrimental to the tires as to other parts of the car. In stopping at the curb the car should not be allowed to strike it or the tires rub in contact with it. A sudden depression of the tire at the point where it meets the curb puts a tremendous tension on the fabric. The rubbing of the casing against the curb may bruise it and tear the narrower portion of the tread at the sides, thus causing permanent injury.

A continuous strain upon certain parts of the tire produces the same results as come from the sudden blows and extreme shocks, only by slower action. For this reason a motor car should not be driven along the rails of car tracks, as many drivers are in the habit of doing. The edge of the rail will press on the tire at the same place all the way around and after awhile will spring the inner ply of the fabric. Speeding has similar effects on tires. Racing machines use up tires of the highest quality and obtain but a minimum mileage from them. The effect of fast driving

is to wear the tires in some degree more than the average.

Fisk

Chicopee Falls, Mass.—Editor Motor Age—In the case of tires the following is important:

Test your air at least once a week with a pressure gauge. Ninety per cent of all tire troubles are caused by under-inflation. Punctures, tread cuts and bruised fabric are usually received when the tire is in an under-inflated condition.

Upon discovering that you have a flat tire, take the tire off, examine the tube and inside of casing for cause. Run your hand around the inside of the casing, as the cause of the puncture may be a small tack or nail not visible to the eye.

Your extra tube should not be carried loose under the seat or in the tool box; as it shuffles about and is apt to come in contact with sharp edged tools and oils. Wrap and pack your extra tube so it will not chafe. Your extra tire should be protected from the action of the weather by a tire cover.

When it is necessary to make a tire change, it is advisable to remove all rust and other foreign matter from the rims before applying the tires. It is a good plan to paint the tire rims with graphite or stove polish, so that the beads will easily slip into their correct position and reduce the chances for tube pinching. Inflate inner tubes just enough to round them out before inserting them in cases. Tubes should be of the same size as the casings. It is advisable to rub the inside of the casing with powdered talc. This will reduce friction and prevent the tube from sticking to the casing.

Be careful in tightening the clamping brackets of the demountable rim. If they are not tightened evenly the rims are apt to wabble and the tires travel at an angle, grinding off the tread in spots.

In the valve stem of your tube is a delicate spring arrangement called the valve inside. It acts as an air check. If the tube is in continual use this little valve inside becomes worn and the spring loses its strength. Occasionally these should be replaced by a new valve inside. They are very inexpensive, and by testing your valve occasionally and tightening same you lessen the chances for a flat tire from a leaky valve.

If your front tires seem to wear out prematurely, it may be due to the wheels being out of alignment, caused by some slight accident. If the tread on your rear tires has the appearance of being ground off in spots, it is usually traceable to the severe handling of the brakes. Apply brakes gently, avoid locking the wheels. Stop your car in such a position that the tires will not rub or chafe against the curb. Avoid running in street car tracks.

See that no water gets inside your extra tires; if it does, take them off and dry them thoroughly. Be sure to have tires well inflated and all nuts tight when car is washed, as water, if it reaches the lining will cause it to rot. Keep oils and acids away from your tires, for if exposed to either for any length of time, they will become worthless. Injuries so caused are often not noticed until after the damage is done. If oil drops on the tires, wipe it off immediately and be sure your car is not left standing on an oily floor in a garage.—Fisk Rubber Co.

Goodyear

Akron, O.—Editor Motor Age—Your article of May 4 on tire care certainly ought to be of vital interest to every motorist, especially since it has become a well-recognized fact that just a little care and attention applied to pneumatic tires will prolong their life greatly and hence decrease the cost of operating a car.

Since tires naturally represent a considerable proportion of the amount invested in a car, anything that will cause them to give the greatest value possible is desirable.

In the following we shall suggest briefly some ways in which this can be done. We will also be glad to send our Service Bulletins, which go into the subject of tire care very thoroughly, to anyone who requests them.

Long mileage or service from tires is dependent on two factors:

First: A good tire.

Second: Proper care and attention.

The first item is dependent upon the tire manufacturer; the second, however, is something over which the manufacturer has no control, and must be supplied by the motorist.

To insure the first element of good service the Goodyear Tire and Rubber Co. for years has maintained a department of highly specialized experts who are constantly looking for new methods in manufacturing as well as for improvements in old methods.

The factor of tire care can easily be supplied by the motorist if he give just a little attention to the tires. Of course a great deal depends on knowing what to do. If the following suggestions are followed out, however, there is practically no reason, barring accidents, why any trouble should be experienced with perfect tires before they are worn out.

The first and most important factor is proper inflation, a subject which has been dealt with in earlier installments of this series.

Since tires are used over all kinds of roads it is only natural that small cuts—the results of glass and small, sharp stones—will be received on the tread. As long as these cuts are small they are not serious because the motorist can take care of them easily.

One of the functions of the tread is to act as a protection for the carcass of the tires and to exclude moisture. Naturally then, anything which will help keeping this tread intact will protect the life of the tire.

It is a good idea to inspect your tires twice a week at least and try to find any small cuts. These cuts should be made free from all dirt, etc., and thoroughly washed out with gasoline. After this has been done, a coat of patching cement should be applied to the place where the cut was received and allowed to dry. When this has been done, Goodyear tire putty should be forced into the cut or injured part. This will fill up the cut and prevent sand and moisture from entering and forcing their way between the tread and the carcass of the tire. The operation described above is very simple and certainly most effective.

For several years the Goodyear Tire and Rubber Co. has been trying to help the users of tires get better mileage, not only by furnishing them with the best tire possible, but by taking an interest in the tires after the motorist secures them. The suggestions on tire care given above have had wide circulation among motorists and especially among that part of them using Goodyear tires.

To ascertain what effect proper care to tires would have, we set about not long ago to collect a few of the Goodyear tires that had given extraordinary service.

The first thousand that we collected had given an average mileage of 9,974 miles. The tires were all turned over to us with testimonial letters, and we offered no inducement for them except paying the people who turned the tires over to us for the scrap value of the tires.

If anyone is not getting his money's worth from his tires, there is a good reason for it. Perhaps it's the tire. Perhaps it's because some important item of tire care has been overlooked. Perhaps a larger size tire ought to be used.—Goodyear Tire and Rubber Co.

Swinehart

Akron, O.—Editor Motor Age—One of the most neglected conditions of tires is the number of cuts which are not taken care of and allow sand and moisture to enter between the tread and fabric, causing a continual friction the same as cutting a piece of stone with a smooth edge saw by pouring on a little sand and water. The traction wave in the tread of a tire causes a continual friction, thereby sawing a hole in the fabric of the tire. A very small cut, the size of a lead pencil, will let enough sand under the tread to spoil the carcass, making it beyond repair. These cuts can be repaired with very little cost and labor.

Careless driving causes a great deal of tire trouble also, and by careless driving we mean the fellow who doesn't care how rough the roads and little for the speed limit, except when an officer is near. Tires are human the same as the driver. They can stand so much and no more. You may drive as fast as you like, but the old saying "We pay the price for all we get" certainly holds true in this instance. In speeding your car, every ply of fabric becomes heated through; the same with the tread. This causes the tread to soften and burn off quickly, not to say anything regarding the number of terrific bumps the casing receives, any one of which ought to be sufficient to cause a blowout were it not for the thorough test this fabric goes through before being made into tires. A sudden blow to the tire forces the inner ply of fabric, which is the shortest, in-so-far that it causes a break, allowing the tube to be forced into the break, causing it to pinch and blow out. Sensible driving will eliminate a great amount of tire expense and, together with the reading of service helps furnished by tire manufacturers, ought to cut the cost and tire expense considerably.—Swinehart Tire and Rubber Co.

Goodrich

Akron, O.—Editor Motor Age—The points which follow are applicable to all makes of tires.

Don't overload your tires. A tire will give out sooner from overloading than from almost any other cause.

Don't underinflate. Underinflation and overloading account for fully 90 per cent of all tire trouble. Use a Goodrich tire caliper or a pressure gauge, and consult carefully the weight and inflation schedule.

Don't neglect small cuts. These will often extend farther than you think. Dirt and wet gets in, the fabric rots and a blowout follows. Look over your tires from time to time, and use Goodrich plastic.

Don't run in ruts, car tracks or against curbing. The side walls of a tire are much thinner than the tread and will not stand this kind of usage.

Don't start or stop suddenly or skid around corners. The strain set up in your tires is terrific. Don't run on a flat tire. Better run on the rim if only for a short distance.

Don't let oil, grease or gasoline remain on your tires. They all destroy rubber. Wash only with pure cold water and a little soap.

Don't keep a spare tire out of use too long. Change over occasionally. A tire lasts better in use than exposed to the sun and rain on the running board.

Don't let your rims get rusty. Common stove polish will keep them in good condition.

Don't let the weight rest on a deflated

tire. Jack up the wheel or remove the tire. Don't let your axles or rims get bent. If your wheel doesn't run free your tire will suffer.

Don't pinch the inner tube, when applying or removing an outer casing. Pass the hand around inside before re-applying the outer bead. Don't try to force a tire on to the wheel. If it goes unusually hard, look for some trouble. Perhaps the valve stem isn't in place properly.—B. F. Goodrich Co.

Ajax

Trenton, N. J.—Editor Motor Age—"Abuse" is defined in the dictionary as "improper use, or treatment, excessive, imprudent or unnatural use; unduly severe or cruel treatment," etc. Abuse in tires may be generally classified as insufficient inflation, stone or glass cuts, running against the ragged edges of car tracks, wheels out of true, severe bruises, neglect of small cuts, etc. Avoidance of these forms of tire abuse will increase the lfe of tires tremendously. The reward is in large ratio with the attention necessary.

No maker of tires can or will underwrite this item of abuse. The finest of rubber and fabric, great knowledge of chemical compounding, skill in vulcanization and a steadfast determination for quality will realize a fine tire. But here enters the user in the equation. If the user conserves the fine qualities of the maker's tire, the service rendered will be large, and the cost per mile low. If, on the other hand, he abuses tires, he sacrifices much of the life and efficiency of his tire equipment.

Blowouts—so-called—are not nearly so common nowadays. In the great majority of cases blowouts are but the evidences of early neglect.

Sand blisters follow small cuts if repairs are not promptly made when inspection detects small tread cuts. Sand is made of glinting sharp stone-like particles which, when they enter the tread cut and hack their way and destroy the tire.

Small cuts, when noted, should be properly and promptly cleaned and repaired, all grit and sand being first removed before repairs are attempted.

If sand is allowed to work its way into the tread of tires, it is only a matter of time when the tread is pried loose.—Ajax-Grieb Rubber Co.

Pennsylvania

Jeanette, Pa.—Editor Motor Age—For treating cuts in the rubber tread, we recommend Kut-Kure.—Pennsylvania Rubber Co.

Kelly-Springfield

Akron, O.—Editor Motor Age—Careful driving will greatly increase the life of a tire. Avoid ruts; avoid running in car tracks; make sure of the wheel alignment; keep rims free of rust and use care in inserting tubes.—Kelly-Springfield Tire Co.

Firestone

Akron, O.—Editor Motor Age—It is suggested that after a long trip, or at regular intervals, the tires be examined carefully. Remove tacks, glass, nails and other objects before they cause serious damage; wash mud and other foreign matter from the tires and heal the cuts, punctures and snags with Cure-Cut or similar preparations on the market for emergency repairs. If unable to repair the injuries in this way, have the work handled by an experienced and competent repair shop.

Before applying tires, remove rust and all other foreign matter from rims. If tires have been ridden deflated at any time, mud may have accumulated on rims and, unless it is removed, the tires cannot seat or fit properly. The danger of pinching inner tubes can be reduced to a minimum by dusting soapstone or powdered mica on the rims, so that the tire beads will slip easily into the correct position.

Inflate inner tubes just enough to round them out before placing them inside of cases. Do not use tubes of the wrong size and be sure that the valves are equipped with spreaders adapted to the particular type of cases used, for instance, clincher, quick detachable clincher, or straight-side. Valves in Firestone tubes are equipped with universal spreader and therefore suitable for use in all three types. Dust the inside of the case and the inner tube with powdered mica or talc. This will reduce friction and prevent adhesion of tube to case after being heated in service.

When the tires have been removed for any reason, it is a good plan, when reapplying, to reverse them, that is, to place the worn sides of the tires toward the car. It is not generally known, though it is a fact, that almost all the side wear to a tire occurs on the side from the car. This is due to road construction, rut wear, curb scraping, etc.

The life of a tire may be prolonged to such an extent that a great deal more mileage may be secured by turning the tires about occasionally to secure even wear upon both sides.

If tire users better understood the construction of inner tubes, and things which contribute to their wearing out, it would be easy, indeed, to secure more and better service. Spare tubes should not be carried in cardboard boxes as furnished from the dealers' shelves—there is danger of the tubes being chafed. Tube bags can be secured for this purpose.

HINTS ON TIRE UPKEEP

Don't keep spares out of use too long.

To prevent inner tube being pinched because bead is not in place securely, apply stove polish or graphite to rim.

When tires have been removed it is a good plan, when replacing them, to place the worn or outer sides toward the car

Don't carry inner tubes in cardboard cartons. The box causes chaffing. Use an inner tube holder.

If the car is equipped with smaller tires on the front wheels than on the rear wheels, an extra tube should be secured for each size.

The cross sections of inner tubes are made a little smaller than the normal air space inside of the cases. It is not advisable to use a 4½-inch tube in a 4-inch case. This usually wrinkles and creases the rubber, with bad results. Do not use a 4-inch tube in a 4½-inch case for any length of time. When this is done the rubber is required to stretch too much and the effect of heat and action due to displacement of air in the tire quickly uses up the nerve and life of the tube.

If put into usage for which it is not designed, the tube will not, as a usual thing, render efficient service. If it were practical to use one size of tube in another size of case, tire manufacturers could effect a big saving in equipment and furnish only a few sizes of tubes.

Lubrication is most important to conservation of the tube, but it is a matter that is given least attention. Practically all tire manufacturers treat the inside of cases with a white solution to prevent tubes from sticking to the adhesive "friction" of the fabric—a good lubricant, however, should also be used.

Some customers neglect dusting soapstone inside of the case when changing a tube—others use the soapstone so sparingly that it does but little, if any, good, or they may use so much that it does more harm than good. If a quantity of it be dumped into the case it will collect at one point, and during the hot weather will heat up to such an extent as to burn the rubber of the tube, making it very thin, brittle and lifeless; this can be recognized by the honeycombed appearance. Soapstone is the lubricant most used for tires and it is quite satisfactory, but not lasting; therefore a fresh supply should be put into the tires at least two or three times during the season. Powdered mica has proven a more durable lubricant than soapstone and quite as effective as graphite, as well as more pleasant to handle.

Michelin

Milltown, N. J.—Editor Motor Age—For the treatment of cuts in the gum of a casing we recommend the use of Michelin Mastic. Cuts in the rubber of casings should be cleaned thoroughly. If a cut in the rubber of a casing is neglected, water will thereby reach the canvas with the result that the carcass of a tire will be weakened and the life of a tire materially shortened. Another result of neglected cuts is that sand and stones will work their way in between the tread and fabric of a casing, loosening the tread and causing what are commonly known as "sand blisters."—Michelin Tire Co.

Empire

Trenton, N. J.—Editor Motor Age—First: Keep tires inflated to full recommended pressure at all times regardless of hot or cold weather.

Second: Fill all cuts promptly with the best cement and tire cut filler, but better still have the tire vulcanized, making the repair permanent.

Third: In turning around never let the front or back wheels touch the curbing. There is no surer way of ruining casings.

Fourth: Start and stop slowly, and never slide the wheels. Brakes are more effective when the wheels do not drag.

Fifth: Never run against a curb when stopping. This breaks the side-walls of the tires and bends and breaks the rims and rim lugs or bolts.

Sixth: Use the very best inner tubes obtainable. If the inflation pressure is lost, even to a small extent, the casing will be rapidly destroyed.

Seventh: A new case should be further inflated every few hundred miles to offset the lost pressure, due to the stretch of the casing when first used.

Eighth: Jack up all four wheels when the car is not in use, and don't start tires in a new season without inflating them to full recommended pressure.

Ninth: Always turn corners very slowly. —Empire Rubber and Tire Co.

Victor

Springfield, O.—Editor Motor Age—Any cement or repair material furnished by any reputable tire manufacturers, a number of which are on the market, are considered good for cuts in treads, but cuts which reach the fabric should be attended to by a competent tire man.

Tires which have been on a car in storage all winter should be removed from the rims in the spring and thoroughly examined for cuts in the tread or breaks in the fabric on the inside of the casing. If any serious cuts are found they should be attended to by a competent repair man.

Small cuts in tread only should be filled with tire cement or tire dough. Before putting tires back on the rims, the rims should be thoroughly cleaned and coated with graphite, and have the casing thoroughly dried in case any moisture is on the inside. —Victor Rubber Co.

Packard Twelve Aviation Engine Tested at Sheepshead

100-Horsepower Engine Put in Special Chassis for Comparison With Other High-Speed Types

THE first of the twelve-cylinder aviation engines being made by the Packard company is undergoing tests at Sheepshead Bay speedway. This is in the nature of a special endurance trial, and for that purpose it has been put in a special chassis, which makes one feel when seeing it that the car should be entered in the speedway events of this year, for it has all the visible qualities of a very fast car. That the Packard company has been developing twelve-cylinder aviation engines has been known for some time, but this is the first time they have been brought as far as a test on a speedway. Several years ago Packard engineers began to study high-speed engines and the research work which led up the aviation engine was under way long before the Packard Twin Six made its appearance.

Began Work Long Ago

With the success of the twin six motor assured, designs were started for two other engines intended solely for aviation. One of these was designed to produce about 100 horsepower, and since this required approximately 300 cubic inches, J. G. Vincent decided to limit the displacement exactly to this volume, as it facilitated ready comparison with other types of high-speed motors developed for racing car work. Therefore, the dimensions chosen for the small engine were $2\frac{31}{32}$ inches by $4\frac{1}{2}$ inches and this is the size of the engine with which experiments now are being made. The large motor, now under construction, has a bore of 4 inches and a stroke of 6 inches, giving approximately 900 cubic inches displacement. Both will follow the same general lines, as a description of the small one will be practically the description of the larger.

For aviation work regular torque and absence of vibration are very important. The regularity of torque has a value in increasing the efficiency of the propellor, while vibration, if present, is destructive to the necessarily somewhat fragile structure of the aeroplane. Light weight, of course, is essential, but it is now customary to consider engine weight inclusive of the fuel, oil and water required. That is to say, it is the weight which must be carried for a flight of several hours' duration which is important and an engine which is economical of fuel and oil easily can be light when weighed together with supplies for a long flight, as compared with another engine which is actually lighter so far as the metal part is concerned but which is more extravagant in operation.

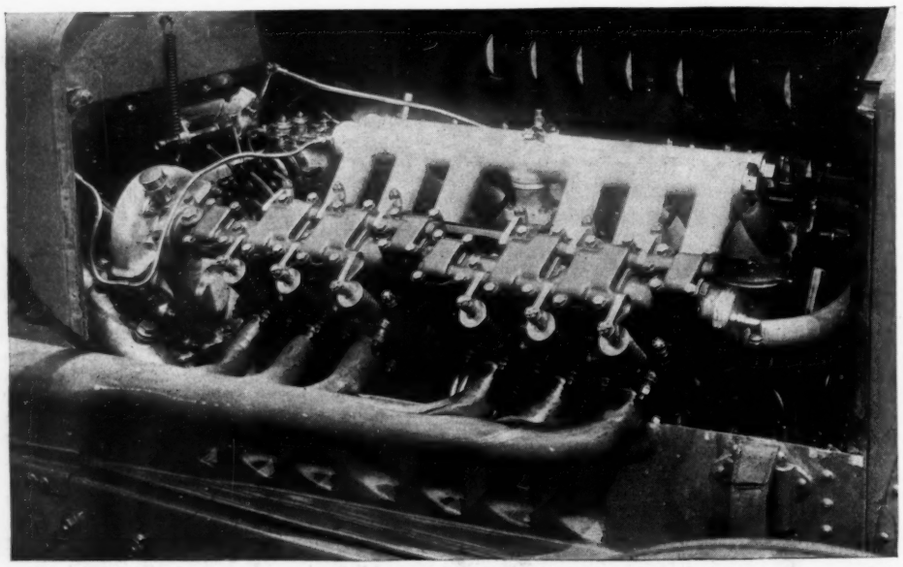
The small Packard aeroplane engine develops its requisite 100 horsepower at 2,300 r.p.m., and its weight is almost exactly 500 pounds. The 100 horsepower, however, is very considerably less than the total ability of the engine which will run and show increasing power up to speeds in the neighborhood of 4,000 r.p.m. At 3,300 r.p.m. the first engine gives 130 horsepower. The power curve is quite smooth as the motor speed falls off and the engine will run quietly and regularly at 300 to 400 revolutions.

Front view of the car in which the Packard aviation engine is being tried out. Note the characteristic Packard radiator

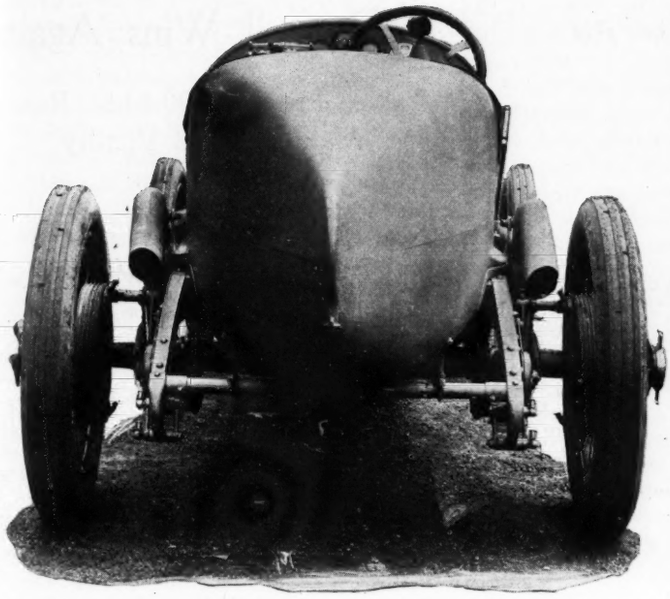
It is now several weeks since the first engine was put on the test block and at first it appeared difficult to find spark plugs which would withstand the very high explosion temperature which is obtained in the cylinders. This trouble has been entirely overcome and the test block failed to show any specific weakness in any part.

Long Test Thought Best

This being the case, Mr. Vincent decided to take a leaf out of the book of the Mercedes company and obtain his duration tests by putting the motor in a chassis which would permit it to run at full power for hours while exposing it to the shock and other indefinite circumstances that accompany a track test, which seem impossible to imitate on the test block. It will be remembered that the Mercedes cars, which won the French Grand Prix in 1914, were all fitted with the aeroplane engine which is generally regarded in Europe as being about the best that has been constructed. The Packard company has no intention of doing any racing and it has been necessary to build a special chassis to enable the motor to be tried out properly. For about a week the chassis has been at work at Sheepshead Bay speedway showing lap speeds between 100 and 110 miles per hour and speeds of 116 miles per hour on the straightway. This is with a gear ratio giving less than 3,000 r.p.m. at 100 miles per hour. No attempt has been made to check the speeds very accurately or to discover the maximum, the bulk of the running being done at about 100 miles per hour, a speed at which the motor is



The Packard small size aviation engine fitted in a special chassis for testing it out on speedways. Note the overhead camshafts with the special form of rocker which prevents any loss of oil. Also the Delco ignition distributor and camshaft drive at rear end



Rear end of the special Packard speed job, the body of which is quickly detachable. A 40-gallon gasoline tank is inside the tail

working just a little harder than it would have to work when its speed was held down by the proper size of propellor in an aeroplane.

No one possibly can see the car which is being used to test this motor without regretting very greatly that it will not be seen in competition, since it is one of the prettiest racing machines that ever has been made.

In designing the chassis the endeavor has been to render it very highly efficient while making it strong enough to provide absolute safety, the object being to test the motor, and the greatest possible care has been taken to have the chassis perfect.

Mechanical Details

Coming to the mechanical detail of the engine, its design is based upon that of the stock twin-six, but it differs very greatly in detail. Firstly, the cylinders are cast in blocks of three and have four overhead valves apiece. Possibly it is in the operation of these overhead valves that the most striking engineering advance is to be found. There is, of course, an overhead camshaft to each set of cylinders. With a camshaft above the cylinders it has always been troublesome to find means for operating the valves without at the same time losing quantities of oil. If rockers are used there is always a slot in the side of the casing through which the rocker operates and it is impossible to make this oil-tight. If the operation is direct as in the Peugeot or Sunbeam, then there must be holes in the bottom of the casing through which the tappets pass to reach the valve stem. In the Packard design this trouble has been overcome by cranking the rockers. The lever which rests on the cam and the lever which touches the valve are at opposite ends of a short shaft. This means that the bearing of the rocker comes between the cam end, which is in an oil box, and the valve end which is outside. The length of the bearing provides a perfect oil seal so that the cam mechanism can be lubricated copiously and yet the valves will remain perfectly clean. This layout can be readily understood by referring to the photograph of the motor.

Considerable thought was given to the best methods for driving the camshaft and, by making comparative layouts, it was found that the balance of the advantages favored the use of trains of spur gears. One of the most important advantages is that the parts of the spur gear trains are very simple and there are no thrust bearings required. Spur gears can be cut from very hard material and finished very highly so that there is no error in the timing due to backlash. Actually in this Packard motor when erected it was found that the maximum error in valve timing was 1 degree on the flywheel which, as any engineer knows, is a remarkable achievement.

For a variety of reasons the rear location is chosen for the spur gears, the crankshaft pinion coming just in front of the flywheel bearing. Owing to the high grade of material the gears are quite narrow, that on the flywheel being only 5/8 inch wide.

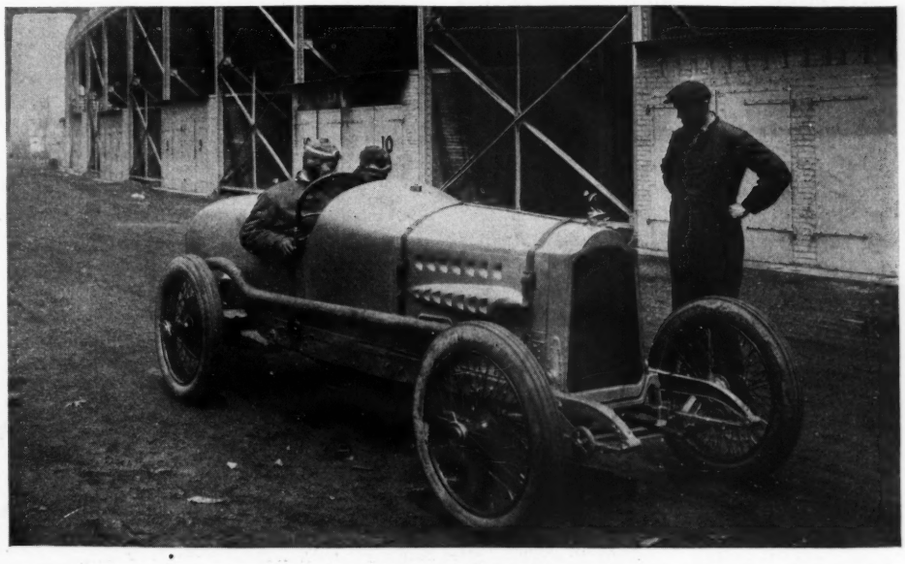
For the connecting rods the stock arrangement has been abandoned and the forked type used instead of the side by side. The reason for this is that the former arrangement is lighter. With an L-head, twelve-cylinder engine, if the valves are well proportioned, the length becomes such that there is plenty of room for side-by-side rods. With the overhead valve, four-valve type of cylinder the length is so greatly reduced that there is not even room for forked rods, if the valves are taken as the limiting factor. Thus, having begun with the valves, the engine was lengthened just enough to give proper bearing surface for forked rods. These rods are made from very high tensile steel of I-beam section and are machined all over. An oil tube carries the lubricant to the piston pin.

Crankshaft Design Unusual

The crankshaft is very unusual as the webs are triangular in end elevation. This design was developed by experiments made to discover the design which would provide the greatest rigidity with the least weight. For both the main bearings, of which there are three, and the crank pins, the diameter is 1⅞ inches, but the triangular webs are so strong that the shaft is completely free from whip throughout the whole speed range. It has been stated already that the connecting rods are very light and this lightness extends to the pistons. These are die-cast aluminum alloy and the whole piston assembly with four rings and piston pin complete weighs 11 ounces.

It is when the valves are examined analytically that one of the advantages of the twelve-cylinder construction appears. in these little cylinders, 2 3/32 bore, there is room for four valves 1 7/16 inches in the clear. The angle of seat is 45 degrees and the lift 34 inches. This gives 1 square inch of valve opening for each 17 cubic inches of piston displacement. The 300-cubic-inch Mercedes, four-cylinder aeroplane engine has the largest valves which can be accommodated and the valve opening in that engine is 1 square inch for each 25 cubic inch displacement.

(Concluded on page 40)



J. G. Vincent at the wheel and Ralph de Palma in mechanic's seat ready for a tryout of the new Packard aviation engine

Entries Coming Fast

Indianapolis Has Twenty-one, New York Twenty-three, Chicago Five

Full Lists Are Expected in All Three Within Next Week

INDIANAPOLIS, Ind., April 29—Indianapolis talent is to be chiefly in control of the 300-mile race on the brick oval May 30. The announcement of the major officials for the event show that George M. Dixon of the National company will wield the checkered flag of starter and Howard Marmon of Nordyke & Marmon will serve as referee. This is the first time that Indianapolis men have served in these two capacities.

The supervision of timing and scoring and technical committee work will be combined under one head, Chester Ricker being made director of scoring, timing and technical committee. Otis A. Porter of the Porter Electric Co., has been made assistant timer, D. G. Ong assistant scorer, and George Weidley, assistant chairman of the technical committee.

That a large entry list will be in by the time the entries close is anticipated, due to the fact that checks have been received for 21 entries at the present time. These are shown in tabulation elsewhere.

TWENTY-THREE FOR NEW YORK

New York, May 2—Special telegram—The entries of an Adams Special and another Sunbeam for the Sheepshead Bay speedway race on May 13, brings the total entry list up to twenty-three. The Adams Special is entered by George Adams, a wealthy sportsman. The Sunbeam is entered by Joseph Christiaens, and is a duplicate of the six-cylinder car which he will drive in that race. No driver as yet has been named for the car. The latest Sunbeam entry is now on its way here from London.

MAY REVIVE DESERT CLASSIC

Los Angeles, Cal., April 29—There is an effort being made to revive the Los Angeles-Phoenix road race. The record breaking runs of Louis Nikrent on Cactus Kate, T. Beaduet on the Cadillac Conqueror, and Joe Nikrent on the Buick Buster, have stirred up interest in fast touring and it is intended to make the next desert classic a race for fully-equipped touring cars just as the cars which have established all the inter-city records in California are fully equipped with body, fenders, top and windshield. The drivers are to be allowed to remove the windshield for safety, but must carry bodies, extra tires, fenders and absolutely stock motor. It is claimed that the cactus derby became a contest for racing cars and meant nothing to the motorist, but, with the cars equipped just as cars are equipped for transcontinental trips.

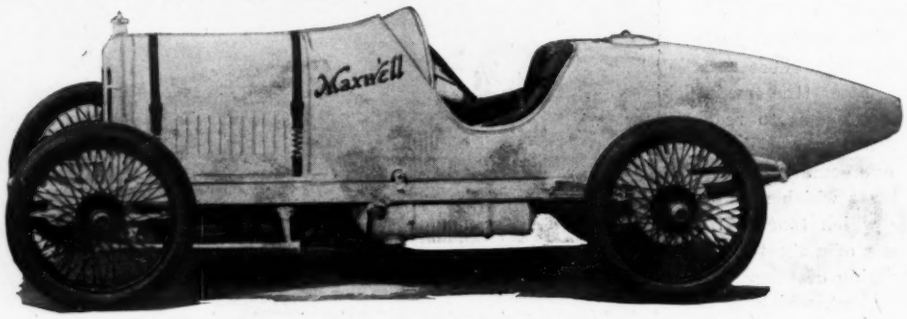
24-HOUR RACE POSTPONED

New York, April 26—The 24-hour race scheduled for the Sheepshead Bay Speedway on June 16 and 17 by the Trade Racing Assn., this city, has been postponed. Several of the car makers who are contemplating entering the event pointed out to the association the advisability of postponing the race until such time as their new models appeared.

Racing Events

May 6—Road race, Gardena, Cal.
*May 7—Track meet, 150 miles, Bakersfield, Cal.
*April 29—Road race, Fresno, Cal.
*May 13—New York, Sheepshead Bay speedway race.
*May 20—Chicago speedway amateur's race.
*May 30—Indianapolis speedway race.
*May 30—Tacoma, Wash., speedway race.
May 30—Minneapolis, Minn., speedway race.
May 30—Track meet, Elmira, N. Y.
*June 4—30-mile race, Sheepshead Bay speedway.
*June 10—Chicago speedway race.
*June 20—100-mile race, Galesburg, Ill.
June 23-24—Interclub reliability run, Chicago.
June 26—Des Moines, Ia., speedway race.
July 4—Minneapolis speedway race.
July 4—Sioux City speedway race.
*July 4—Track meet, Coeur d'Alene, Ida.
July 4—Road race, Visalia, Cal.
July 4—Track meet, Elmira, N. Y.
July 15—Omaha, Neb., speedway race.
July 15—Track meet, North Yakima, Wash.
July—100-mile track meet, Burlington, Ia.
August 5—Tacoma, Wash., speedway aces.
*August 11-12—Hillclimb, Pike's Peak, Colo.
August 12—Track meet, Portland, Ore.
August 18-19—Elgin road race.
August 26—100-mile track meet, Kalamazoo, Mich.
September 4—Track meet, Elmira, N. Y.
September 4—Indianapolis speedway race.
September 4—Des Moines, Ia., speedway race.
September 4-5—Track meet, Spokane, Wash.
September 16—Speedway race, Providence, R. I.
September 29—Track meet, Trenton, N. J.
September 30—New York, Sheepshead Bay speedway race.
October 7—Philadelphia speedway race.
October 7—Omaha speedway race.
October 14—Chicago speedway race.
October 19—Indianapolis speedway race.
October 21—Track meet, Kalamazoo, Mich.

* Sanctioned by A. A. A.



One of the Maxwells which will be entered in the big speed way meets this season

O'Donnell Wins Again

Takes Fresno 300-Mile Race, Making Third Victory in 3 Weeks

Near Riot When Cooper Is Disqualified for Mechanic Change

FRESNO, Cal., April 29—Eddie O'Donnell, the diminutive Duesenberg pilot, brought the total of his California winnings up to $11,500 today when he won the 300-mile Raisin classic trophy race, the Naires trophy and $3,000 before a crowd of more than 40,000 race enthusiasts. O'Donnell's time was 4 hours, 54 minutes, 13 seconds, an average of 61.01 miles per hour.

Jim Parsons, the speed king from Washington, finished second with a Stutz, finishing 4 minutes behind the winner, and Frank Elliett, driving the old Mercer Monk, now known as the Gordon Special, third. Elliott, and Clyde Rhodes, who took fourth money in a Studebaker special, did not finish the race, but were flagged down and awarded the places. With a lead of approximately two laps, Earl Cooper, in a Stutz, was disqualified at 182 miles by Referee P. J. Walker for changing mechanics without reporting to the referee. The disqualification of Cooper, who is a Fresno boy and a great local favorite, caused a near riot. Cursing spectators swooped down out of the grand stand on to the course and it was necessary for the militia to use riot tactics to protect the referee and keep the course clear enough for the race to continue.

Lack Police Protection

The course was not policed, there being only a few guards on the 7-mile course. During the race, spectators and even motor cars crossed the path of the speeding cars.

The first wrangle occurred at the drivers' meeting. Certain drivers objected to N. R. Cooper starting the classic. According to the contest rules of the A. A. A. no promoter, or his representative, may be appointed to any official position. N. R. Cooper, brother of Earl, is secretary of the association which promoted the race. The referee and other officials were willing to allow Cooper to officiate, but a wire from Chairman Richard Kennerdell was received by E. J. Cheffins, A. A. A. representative in Northern California, who was in charge of the event, simply stating that Rule 15 was to be inforced.

Cheffins then acted as starter. Referee Walker wielded the white flag when Cooper was disqualified and the assistant starter gave the checkered flag to the winner. To say that the race was poorly

managed hardly suffices adequately to express it.

There were women standing up in the pits and the crowd edged out on the course many times. The wire fence in rear of the pits was finally torn down, allowing spectators to roam at will through the pits.

Eddie O'Donnell, who only stopped twice, used a Miller carbureter and Oilzum as lubricant. Until his disqualification Cooper had driven a great race, his engine was going well and he was looked upon as the winner. Almost from the start of the race the toll on engines and tires for the cars was heavy. The road over which the drivers speeded was in many places soft and in others ruts shook the vitality out of the cars. Only six of the fifteen starters finished.

The fastest lap was turned by Hughie Hughes, who completed the 7 miles in 5 minutes flat, an average of 83.2 miles an hour.

So heavy was the toll on the racing cars that at one time but three were speeding around the course, the other twelve being in the pits either disabled or for repairs.

Out 2 Hours; Goes Back

It was in the belief that there would not be four cars still running at the finish that led Frank Good, who went out at the end of 70 miles, to make repairs and return to the track 2 hours and 4 minutes later near the end of the race. He drove until the end on three cylinders, and he also had removed one connecting rod.

Al. G. Waddell, Los Angeles, newly-appointed member of the A. A. A. contest board, was not present on account of illness in his family. Many drivers claim that had Waddell been present, the race would never have started on account of the lack of police protection and the condition of the course.

ROAD RACE FOR SEMI-PROS

Gardena, Cal., April 28—The speed event for semi-professionals which will be staged at Gardena on May 6 will be the first road race ever held in southern California minus an admission fee. This race will be a part of the Strawberry Day celebration, another feature of which will be a great floral pageant.

Entries will be restricted to cars having a piston displacement of 231 cubic inches or under. The event will be classed as a class C, division 5, race, and will be the first of its kind ever sanctioned by the A. A. A. in southern California. In addition to the prize money, a valuable trophy will be offered, and it is expected that a large field of small cars will be entered.

Light Up Gotham Track

Speedway Will Be Illuminated for Night Driving and Special Events

Twenty-four-Hour Race Will Profit by This Arrangement

NEW YORK, April 29—The flood lighting of the Sheepshead Bay speedway and the 160-acre interior field, will make it the largest illuminated area in the world for holding night outdoor sporting activities, races and military maneuvers. An initial installation of 370 flood light projectors, each with a 500-watt, gas-filled Mazda lamp, will be used to illuminate this large space with a light intensity never before attempted on so large a field.

The interior field, which is a fair-sized farm within the 2-mile speedway, will be lighted from 224 flood light projectors spaced all round the outer edge and directed upon the field. These units will be installed on poles 30 feet above the track and will give an even intensity illumination over the total field of approximately 50 to 100 times full moonlight. This intensity will be further increased in the section just opposite the grandstand by focusing 114 additional flood lighting units on this space, the projectors being located at the top of the grandstand and well out of the line of vision. The indirect light from these lamps will also light the boxes in the lower tier of the grandstand. Thirty-two additional flood lighting units will be installed to light the fences, thus lessening the number of patrolmen necessary to guard the track.

The 224 projectors around the two-mile track are arranged so they can be readily turned upon the race course, producing a ribbon of light for the entire 2 miles of 70-foot track and the 30-foot safety zone. With this arrangement all light sources will be hidden from the eyes of the drivers and the light will come from both sides of the track, always flooding ahead and in the same direction as the speeding machines.

Race Entries to Date

SHEEPSHEAD BAY, MAY 13

Distance, 140 miles	Purse, $15,000
Driver	Car
Christiaens	Sunbeam
Limberg	Delage
———	Delage
Lecain	Delage
———	Delage
Mulford	Peugeot
G. Bergdoll	Erwin
Stecher	Erwin
Chandler	Crawford
Davis	Crawford
———	Crawford
Aitken	Peugeot
Rickenbacher	Maxwell
Henderson	Maxwell
O'Donnell	Deusenberg
D'Alene	Deusenberg
———	Deusenberg
Resta	Peugeot
Franchi	Sunbeam
Miller	Mulford Special
Thompson	Olsen
Watson	J. J. Special
Adams	Adams Special

INDIANAPOLIS, MAY 30

Distance, 300 miles	Purse, $30,000
Driver	Car
Christiaens	Sunbeam
Rickenbacher	Maxwell
Henderson	Maxwell
Louis Chevrolet	Frontenac
Arthur Chevrolet	Frontenac
Gaston Chevrolet	Frontenac
O'Donnell	Deusenberg
D'Alene	Deusenberg
———	Deusenberg
Ostweg	Ostweg Special
Mulford	Peugeot
Oldfield	Delage
DuChesneau	DuChesneau
Rooney	Premier
Stillman	Premier
Gil Anderson	Premier
Merz	Peugeot
Aiken	Peugeot
Resta	Peugeot

CHICAGO, JUNE 10

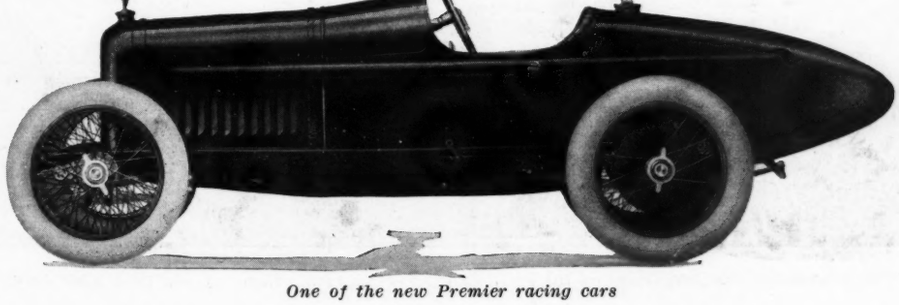
Distance, 300 miles	Purse, $30,000
Driver	Car
Christiaens	Sunbeam
———	Sunbeam
O'Donnell	Duesenberg
D'Alene	Duesenberg
———	Duesenberg

$4,500 FOR MASTER DRIVERS

New York, April 29—By arrangement with the contest board of the American Automobile Association, the Bosch Magneto Co. will present the master driver selected by the board with the silver Bosch trophy valued at over $1,000 and $2,000 in cash. The trophy will also bear the secondary title of champion motor car driver trophy. To the driver rated second in the number of points awarded in the master driver contest the Bosch company will give $1,000 in cash and to the third driver, $500 in cash. All these prizes will be won outright.

BOILLOT SMASHES GERMAN FLYER

Paris, April 6—Second Lieutenant Georges Boillot, aviator, brought down his first German aeroplane, a Fokker, on March 31 in Haute-Alsace after a rapid dual with mitrailleuses. Boillot entered the motor-car service when the army was mobilized at the beginning of the war. He is said to have been chauffeur to Joffre for a time, but to have resigned, owing to his fondness for speed, which threatened to deprive France of her Generalissimo.



One of the new Premier racing cars

Pointing the Way—1916 Blue Books Show New Routes

Three New Volumes Added, Making a Total of Eight—Many Additional Roads Charted

THE Automobile Blue Book for 1916, revised to include the many hundreds of miles of roads built and improved last year in every state, has just come from the press. A new volume has been compiled covering the southeastern states, including the states east of the Mississippi river and south of the Mason and Dixon line and Louisiana. The Blue Book in the enlarged form consists of eight volumes. These are as follows: Vol. 1—New York state and adjacent Canada. Vol. 2—New England and the Maritime Provinces. Vol. 3—New Jersey, Pa., Del., Md., D. C., W. Va. Vol. 4—The Middle West States. Vol. 5—Mississippi River to the Pacific Coast. Vol. 6—The Southeastern States. Vol. 7—Metropolitan Automobile Blue Book. Vol. 8—Pacific Coast Blue Book.

To revise the Blue Book and publish the annual edition entails the continuous service of a corps of traveling field scouts. It was necessary to cover 40,000 miles of highway in the states of the middle west for the single volume covering that section. Representatives of the Blue Book at some time have covered all of the routes in the southern states that are described in the new volume. The revision necessarily extended through other features of the book, such as the pilot maps and illustrations.

The good roads propaganda gained stronger impetus in 1915 than at any previous time. The combined efforts of many, the highway associations, the states and the governments and motorists at large toward road betterment led to the building of more miles of new highways last year than in any preceding season. Motoring parties carrying staff men of the Blue Book rode over these routes and each carried a log book from which the information was transcribed as it appears in the pages of the Blue Book.

Europe is closed to motor travel. The continuation of the war throughout another summer must mean that greater numbers of motor cars will travel the tourist routes of the United States than ever before. This was borne in mind in the preparation of the revised Blue Book. The publisher anticipates motor touring on the largest scale in history and has printed almost double the quantity of Blue Books that were issued in 1915.

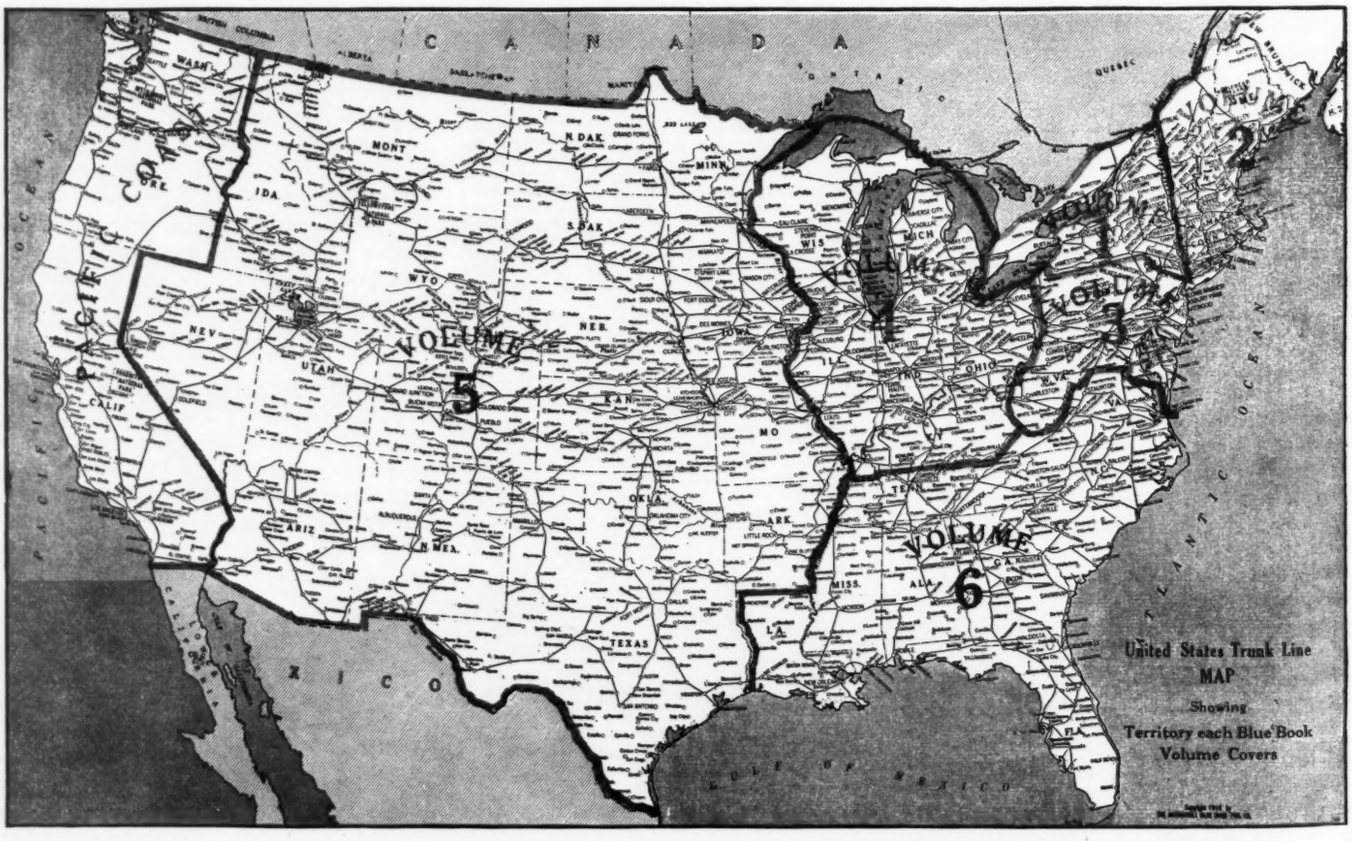
Motorists familiar with the Blue Book will understand the method adopted in fixing the geographical divisions and describing the routes leading across the division boundaries. Those who will use it for the first time, however, may consider it desirable to know that the inter-volume routes in each book extend to the first route centers across the boundary of the section covered in each volume.

The New Southern Volume

The strides taken by the south in road improvement have stimulated interest in touring in a distinct degree and the appearance of Vol. 6 of the Blue Book is in response to a growing demand for an accurate road guide in the southwestern states. Scores of halftone illustrations showing the traveler scenes that are typical of the beauty of the southland have made this volume one of the most attractive of the series. From Tennessee to Florida, from Louisiana to Virginia, through the Allegheny mountains and the cities of southern environment, the main routes of travel and the points of special interest are designated for the convenience of resident and non-resident motorists.

New York and New England Volumes

The Pilot road maps included in the New York and New England volumes for the first time in 1915 have met with the greatest approval and will become a permanent part of these volumes. They are



Map showing boundary lines of the sections covered by each volume of the 1916 *Blue Book*

based on the scale of 3 miles to the inch and show the entire network of crossroads not shown in the regular maps and running directions of the books proper. Thousands of miles of new and improved roads are included in each of these volumes for 1916. Vol. No. 2 alone has 20,000 miles of revised data.

Territory of Volume No. 3 Revised

This volume now covers New Jersey, Pennsylvania, Delaware, Maryland, the District of Columbia and West Virginia, with extension routes to Richmond, Va., and Norfolk, Va. In addition to several hundred miles of route revisions, a set of Pilot road maps similar to those appearing in volumes 1 and 2 have been added on the same magnified scale. These maps cover New Jersey entire, and all of eastern Pennsylvania.

New Routes in Western Volumes

In the western states road improvement has been carried forward on a truly large scale. In the far west, a new transcontinental route has been drafted through the northwest via Montana, Idaho and the beautiful Yellowstone park section to Seattle. This highway appears in the Blue Books for the first time. It has been put in first-class, tourable condition, and will no doubt prove a very popular and much used thoroughfare to the Coast henceforth.

A New Metropolitan Guide

This volume will be on the market about the middle of June and will have some entirely new features that should make it easily the most popular of all the Blue Books. It will cover New York City and the main highways within a radius of 75 miles. Its general make-up will be the same as the maps and running directions in the other volumes, but the main feature will be a classified list of the ten half-day, full-day, week-end and 3-day trips. These trips will be shown by colored maps and will include all of the best runs, the most scenic sections and most interesting points in the vicinity of New York. To the thousands of pleasure-car owners in and around New York this volume should prove invaluable.

Pacific Coast Volume

The 1915 issue is still current for 1916 and covers the highways of California, Oregon and Washington, with extension routes into British Columbia. Probably no section in the entire United States offers more delightful touring than the Pacific coast states, and this volume will always be one of the most popular to car-owning touring motorists.

The A. A. A., as usual, has adopted the Blue Books for 1916 as their official guide. In addition eleven of the most prominent local motor clubs have arranged with the publisher for a special club edition to be given free to their members. These clubs, of which the list follows, are some of the most active organizations in the country, which are now working in the interests of motoring in general and good roads in particular.

Enters Third Year

The Blue Book National Touring Bureau is entering its third year of its existence and has probably the most complete facilities of any organization in the country. Its services are open to any owner of a Blue Book and last year about 20,000 motor parties were routed over extensive trips through its aid.

The Blue Book is truly an institution among motor tourists, having been born with the motor car and grown up with it. The present issue marks the beginning of its sixteenth year. It has well been called the motorists' Baedeker of the United States.

Answers to Inquiries for Route Data

New Orleans, La.-Peoria, Ill.

NEW ORLEANS, La.—Editor Motor Age—Kindly give me the best route from New Orleans, La., to Sturgis, Ky., and from Sturgis to Peoria, Ill.—John B. Fisher.

On your trip to Sturgis, Ky., the following route may seem rather long to you, but you will find it to be over the best roads for motor car travel, taking the trip as a whole. Take the ferry over to Mandeville, then follow the shore road through Lacombe, Logtown, Pass Christian, Long Beach, Gulfport, Biloxi, Scranton, Mobile, then go north through Mt. Vernon, Leroy, Jackson, Thomasville, Octagon, Thomaston, Safford, and Selma to Montgomery; north through Clanton, Jemison, Calera, Pelham, Birmingham, Pinson, Village Springs, Oneonta, Blountsville, Garden City, Hanceville, Cullman, Falkville, Decatur, Athens, Elkton, Pulaski, Columbia and Spring Hill to Nashville.

From Nashville go through Springfield, Adams, Clarksville, Hopkinsville, Crofton, Earlington, Madisonville, Senit, Dixon, then over to Sturgis. From Sturgis to Peoria, retrace your route to Dixon, then north to Cairo, Ky., Henderson, then north to Evansville, Ind., north through Princeton, Vincennes, Sullivan, Terre Haute, then to Paris, Champaign, and Bloomington to Peoria.

Volumes 6 and 4 of the Blue Book will give you complete routing for your trip. Automobile Blue Book Co., Mallers building, Chicago. Price, $2.50 per volume.

Rogers, Ark.-Roanoke, Va.

Rogers, Ark.—Editor Motor Age—Kindly give me the best routing from Rogers, Ark., to Roanoke, Va., via St. Louis, Mo.—T. S. McNeil.

On your trip to Roanoke, Va., via St. Louis, go through Clintonville, Gravette, Sulphur Springs, Pineville, Goodman, Neosho to Joplin, then over to Carthage. From Carthage to Springfield there is a good road going through Mount Vernon, Chesapeake and Republic. From Springfield go to Bolivar and Clinton, then over to Sedalia, through California to Jefferson City, then from here the best road to St. Louis is to go up to Fulton, through Danville, Warrenton, Wentzville to St. Charles, then into St. Louis.

In going to Roanoke from St. Louis, believe you will find the best road via Belleville, Salem, Olney, Vincennes, Wheatland, Washington, Cannelburg, Shoals, Mitchell, then north to Bedford, where you turn east for Valonia to Seymour, Versailles, Aurora, Lawrenceburg to Cincinnati. Then through Milford, Fayetteville, Hillsboro, southeast to Portsmouth, and Ironton, crossing the river to Ashland, east through Huntington and Charleston, south to Montgomery, White Sulphur Springs, Covington, Clifton, Forge, and Troutville to Roanoke.

Volumes 5, 4 and 6 of the Blue Book will give you complete running directions for this trip. These books may be procured either from your local dealer or the Automobile Blue Book Publishing Co., Mallers building, Chicago. Price, $2.50 per volume.

Springfield, Ill.-Maine

Divernon, Ill.—Editor Motor Age—I am planning a motor trip for this summer from Springfield, Ill., to eastern Maine through Portland, Me. What route does Motor Age recommend, and where and at what price can one secure the Blue Books?—Walter Ryerson.

For your trip to Maine there are a number of ways you can go, but probably the most direct for you would be to go from Springfield to Champaign, Lafayette, Fort Wayne, Defiance, Napoleon, Bowling Green, Fremont, Bellevue, Norwalk, Oberlin, Cleveland, Erie, Buffalo, Caledonia, Canandaigua, Syracuse, Utica, Amsterdam, Saratoga Springs, Manchester, Claremont, Newport, Concord, Portsmouth, then up to Portland.

Volumes 4, 3 and 2 of the Blue Book will give you complete routing. Volume 4 from Springfield to Buffalo; volume 3, Buffalo to Saratoga Springs, and volume 2, the balance of the distance. These may be procured either through your local dealer or from the Automobile Blue Book Publishing Co., Mallers building, Chicago. Price, $2.50 per volume.

Alliance, Neb.-Springfield, Mo.

Mountain View, Mo.—Editor Motor Age—Kindly give me the best routing from Alliance, Neb., to Springfield, Mo. I intend to drive a 1916 Studebaker Four.—Dick W. Strong.

On your trip to Springfield, Mo., believe you will find it better to come down to Bridgeport and Sidney, then follow the Lincoln highway to Chappell and take the cut-off to Big Springs. Here you pick up the Lincoln highway again going through Ogallala, North Platte, Lexington, Kearney, to Grand Island, then through Aurora, York and Seward into Lincoln, Neb. Continue east to Nebraska City, where you turn south to Hiawatha, then over to Atchison and Kansas City, passing through Leavenworth.

From Kansas City to Springfield, Mo., there are two routes: One is a little bit longer, but over slightly better roads, that is going through Harrisonville, Butler, Nevada, Lamar to Carthage, then going over to Mt. Vernon and Republic, then into Springfield. The shorter route is to go from Harrisonville to Clinton, then through Oseola, Bolivar, and then down to Springfield.

Volume 5 of the Blue Book will give you complete routing from Sidney to Carthage.

Meridian, Miss.-Birmingham, Ala.

Meridian, Miss.—Editor Motor Age—Kindly outline the best route from Meridian, Miss., to Birmingham, Ala., also from Spartanburg, S. C., to Hickory, N. C.—John S. Hale.

We have heard of a direct route running from Meridian, Miss., to Birmingham, Ala., which goes through Tuscaloosa, but we know definitely that the following route is good, and that motor cars are going over it. It goes through the following towns: Cuba, Livingston, Coatopa, Demopolis, Uniontown, Safford, Selma, Prattville, Montgomery, Verbena, Jemison, Pelham, Birmingham.

From Spartanburg to Hickory go through Gaffney, Blacksburg, Kings Mountain, Gastonia, Charlotte, and Lincolnton.

Volume 6 of the Blue Book contains complete running directions. Price, $2.50. Automobile Blue Book Publishing Co., Mallers building, Chicago.

Tells Quakers How Trucks Aid Army

Lessons of European War in Moving Supplies Presented by Major Francis Lawton

PHILADELPHIA, Pa., April 27—"American soldiers would never be able to operate a line of communication from Columbus, N. M., to Casas Grandes without the use of motor trucks, which they were obliged to purchase in order to maintain a line of communication," said Major Francis Lawton of the Commissary Dept. of the East, U. S. A., the speaker of the evening at the meeting of the Pennsylvania Section of the Society of Automobile Engineers, held at the Engineers' Club last night.

Major Lawton's paper was in the nature of a presentation of facts which would inform motor truck owners, manufacturers and dealers what problems they would have to meet in taking care of the commissary department of an army in time of war. His opening remarks urged the necessity for promptness in laying out a plan of operation. He dwelt on the difficulty of transportation, especially for fast-moving columns which are now employed in modern warfare.

Expedite Troop Movements

"No branch of preparedness has received so little attention," Major Lawton said, "and the neglect is no doubt due to the fact that few realize that conditions have changed. Animals can always be secured, but motor trucks are different. Conditions are all changed now, and the lessons of Europe show that rapidly-moving troops must rely on motor trucks.

"The tactical unit of an army is the division consisting of 22,000 men. This requires 175,000 pounds of food per day. In the armies of today the men are numbered by millions instead of thousands, and to accomplish the great task of organization necessary to handle the problems presented by these large armies we must have the support of the Society of Automobile Engineers.

"Two methods of securing food are available to men on the march or fighting in hostile countries—first forage, and second by carrying. Gustavus Adolphus and Napoleon, the two great tacticians, used both methods. Modern armies rely on the country in which they are operating and also draw from the rear. The French regulations state that an army in the field must draw on the country as if it were the only source of supply, and the rear must be drawn upon as if it also were the only source of supply. The amount carried on the march amounts to about 1,250,000 pounds for a division, and the method is to ship from the purchase point or main base to the advance depot, from the advance depot to the refilling point and from the refilling point to the various distributing points along the firing line. The carrying is done between the refilling point by supply trains, ammunition trains, sanitary trains and engineers' trains.

"The supply train carrying the food, etc., is the most active, as it must supply provisions for both animals and men. The distance of the firing line from the advance depot determines the number of refilling points, but the distance from the firing line to the last refilling point should not be more than 1 day's march.

"With animals the average march is 18 miles per day, and with a total distance of 75 miles from the base 780 wagons would be required. With motor trucks of about 2 tons capacity the work could be done with 120 vehicles. With 240 trucks a division could operate 150 miles from its base. A division operating 40 miles from its base would require thirty trucks.

"Lessons from the present war in Europe teach us the following facts:

"1—Ordinary commercial trucks are best, the special body types not necessary.

"2—Light chassis for ambulance work are best.

"3—Best all-around car, 1½ tons.

"4—Heavy armored cars have proven satisfactory.

"5—Motorcycles on a grand scale are unsatisfactory.

"6—Passenger cars make good ambulances, but the body should be arranged so that the driver is over the engine and the wounded lie between the axles.

"7—Radiators are proving to be the weak spots.

"8—The steel plate wheel is satisfactory.

"9—Electric starting is satisfactory.

"10—Electric headlights should be mounted on universal joints.

"United States government favors the 1½-ton truck on account of its ability to traverse the ordinary bridges without breaking them down. This, of course, only refers to the divisional trains, as larger trucks can be used satisfactorily on the main roads. To attempt to use trucks of 3-ton and over-spells disaster.

"A force of 500,000 men requires over 8,000 trucks of 1½-ton capacity, and the problem is where and how to get these trucks. They must be organized into units of the same make if they are to be effective."

MACK IN STRENUOUS TEST

New York, April 29—Loaded with 200 rear axle forgings, a Mack AC model 3½-ton truck has been undergoing some strenuous tests under the direction of the engineering department of the Automobile Club of America. These tests have been undertaken by the International Motor Co. to demonstrate the adaptability of heavy trucks to high speeds, such as demanded in fire, police, motor bus and military work, and to show what fuel consumption may be expected.

The first test was made Wednesday, April 4, on the Long Island Motor Parkway, a 45-mile stretch of speedway, after the refusal of the Sheepshead Bay Speedway Association to permit the truck to be tested on the Sheepshead Bay track. This test was preceded by a run from New York to Yonkers and return, under full load and with the standard sprockets. Between 45 and 50 miles were covered, with an average fuel consumption of between 6 and 7 miles per gallon.

The speed test on the parkway consisted of about 90 miles of running, during which time the truck averaged about 35 miles per hour, the maximum attained being 52. The total weight of the truck and its load was 16,770 pounds, of which about 9,000 was the weight of the chassis itself, leaving a net load of 770 pounds in excess of the rated capacity of the truck.

The only changes from stock were the application of an auxiliary oil tank back of the cab with a hand-pump feed, by which the oil might be pumped into the crankcase; a restricted overflow passage on the upper oil tank to increase the oil pressure and twenty-five-tooth sprockets on the jackshaft to give a 5.42 to 1 gear ratio.

A second test is being conducted on the Motor Parkway today, using a different make of carbureter. The Automobile Club has not issued its report on the tests as yet and so only approximate results can as yet be given here. In the first test a valve stem was broken and the full distance of 100 miles was not covered, which requires that a second test be conducted.

TRESPASSERS ON RESERVOIR SITE

New York, April 28—Motorists driving over the state highway in New York through Westchester county, between White Plains and Mt. Kisco, are warned by the board of water supply of the city of New York against trespassing on the waterworks lands lying adjacent to the Kensico reservoir of the new Catskill mountain water system of the metropolis.

Some motoring parties have dug up and removed young trees and shrubs and often have started fires, accidentally or otherwise, says the secretary of the board, who also calls attention to the fact that arrests have been made for such offenses and that the motorists guilty of trespassing, when charged with larceny for taking away trees, have been indignant. Instructions have been given to the aqueduct patrolmen to prevent trespassing. The marginal lands along the reservoir were acquired for the protection of the water from contamination and therefore are closed to the public. Trees and shrubs have been planted for the better preservation of the shores as well as to beautify the site.

Getting Next to Nature Via Modern Motor Car

Studebaker Six with Removable Front Seats Makes Possible Comfortable Sleeping Quarters

Top, ready to retire; bottom, preparing the meal; in circle, spreading the cloth for breakfast

HOW to transfer a motor car into a veritable hotel—one on the American plan at that—is well illustrated on this page, showing two representatives of the fair sex and their Studebaker six.

A novel feature of the new series Studebaker cars is employed in each of these views. This feature is the removable front seats, which are of the individual, divided type, and have the advantage of being reversible or entirely removable, as the occasion demands.

Aside from their artistic value, these pictures have their practical side, for each year finds more and more motorists getting away, far from the crowds, to remote places, where they can stage the ultra-modern version of camp life—in the midst of happy hunting grounds or at the brink of a stream where the fish are always biting.

In one of the above pictures one of the pajama girls is shown preparing a meal, properly observed by the other. Another view discloses both of them sitting down to enjoy the same meal. The third picture illustrates the fair damsels ready for retiring.

CHARGE GASOLINE THEFT

Philadelphia, Pa., April 29—A number of arrests have been made here and at least fifty more are contemplated through the unearthing of a huge scheme in which the Welsbach Street Lighting Co. was robbed of 400,000 gallons of gasoline, valued at upwards of $90,000. Among those implicated are lamplighters, wagon drivers and a number of small garages who received the stolen goods. The company maintains five supply stations in various parts of the city. From these the men would get their supply of gasoline to refill the street lamps and invariably would take more than necessary.

The company does not have any system for checking gasoline. The overdrawn supply would be sold to unscrupulous garages at a reduction of the prevailing market price, ranging from 15 to 20 cents per gallon. As the cost of gasoline has steadily risen in the last year, more than doubling itself, the men found the business profitable. Fourteen of them have been held under $400 bail each for further hearings.

ROADS IN ALASKA

Washington, D. C., April 29—Alaska as a touring ground may not be very attractive, but nevertheless considerable work is being done to develop roads and open trails by Colonel W. P. Richardson, of the U. S. army, who for the last 17 years has been charged with that work in our most northern possession.

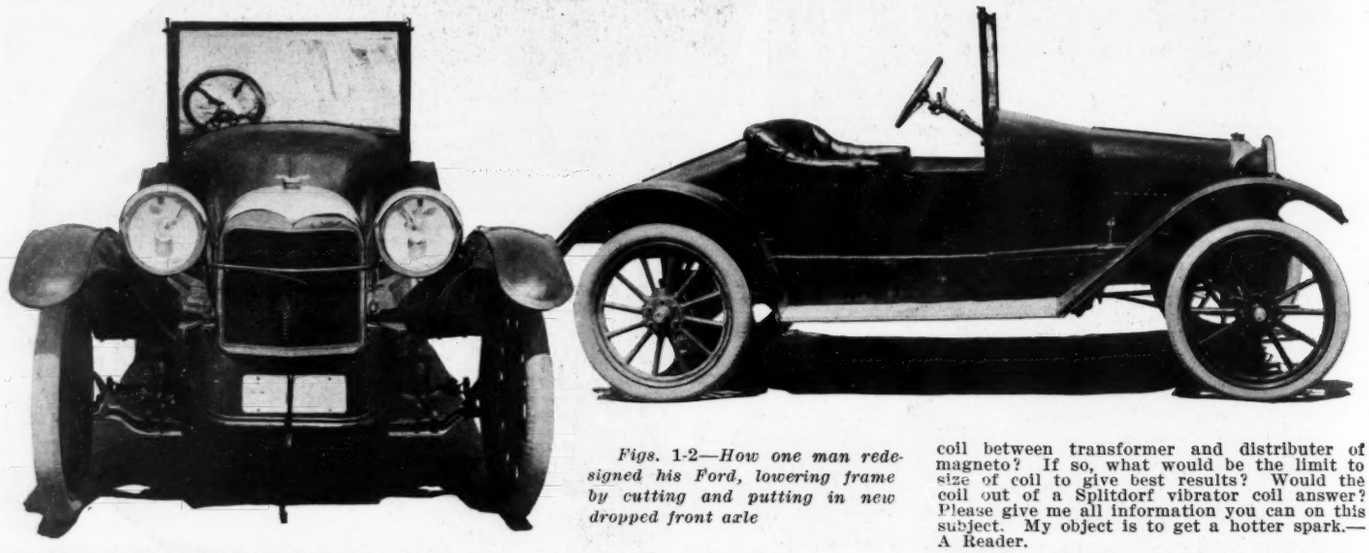
Much preliminary work and examination was necessary, as the country is very difficult for the establishment of roads. Since the work of building began in 1906, the commission has constructed and maintained 901 miles of wagon roads, 557 of winter sled roads, and 2,216 miles of trails. The average cost of the three different classes has been $3,000, $325 and $100 a mile, respectively.

RAILROAD ABSOLVED FROM BLAME

Lansing, Mich., April 29—In the supreme court of Michigan, in the case of John S. Sanford, of Battle Creek, Mich., against the Grand Trunk railroad, Judge Brooks reversed the earlier decision against the railroad and held that a motor car driver, when approaching a railroad crossing, must stop, look and listen in such a way and at such a distance from the crossing that it really can be shown that he took all necessary precautions in the case.

"The duty of a motor car driver approaching tracks where there is restricted vision, to stop, look and listen, and to do so at a time and place where stopping, and where looking and listening will be effective, is a positive duty and the safeguarding steps the plaintiff failed to take. He stopped where stopping served no purpose, and failed to stop where stopping would have disclosed danger. He made chance, and not sight, the guarantee of his safety," is part of Judge Brooke's deciding opinion.

The Readers' Clearing House



Figs. 1-2—How one man redesigned his Ford, lowering frame by cutting and putting in new dropped front axle

READER REDESIGNS HIS FORD CAR

Lowers Frame and Drops Front Axle—Gets 50 M. P. H.

CORONA, Cal.—Editor Motor Age—I have read with a great deal of interest various plans in Motor Age for transferring the Ford into a racing car and believing that my own experience may be of some assistance to other Motor Age readers, I am sending two photographs illustrating my redesigned Ford as it is today. The side illustration of the car does not show as I ultimately intend to have it. I expect to make a cloverleaf body for it some time this summer.

I lowered the frame considerably by cutting the side members a short distance in front of the rear axle and putting in an angle iron in the side. See Fig. 3. The cost of dropping the frame was a little less than $7.

As shown the car is made up of Maxwell mud guards, Gray & Davis lamps, National radiator and the cut-down Ford body. I am using a Master carbureter and am able to get 50 miles per hour out of the car as it stands. It will be noted in the head-on view, Fig. 2, that the front axle is dropped which, together with the lowering of the rear part of the frame, materially lowers the center of gravity.—J. W. Collinge.

Steam Mixture in Fuel

Springfield, Ill.—Editor Motor Age—Water sprayed into the intake manifold or admitted in the form of steam without a question makes the motor perform better, and seems to keep down the carbon and apparently makes the motor more efficient in every way. I have never seen in print any articles, tests, or theory explaining why this should be. Kindly advise me where I may procure from books, or otherwise, some reliable, scientific information on this subject.—Reader.

1—Tests of introducing steam into the manifold have proven the advantage of such procedure, but there does not seem to be any very definite theory advanced as to why this is so. Probably the steam assists in better breaking up of the fuel and vaporizing it, also in adding oxygen better to assist combustion. We do not know of any books on the subject, but you might write C. L. Nedoma, care of the Chalmers Motor Co., Detroit, Mich., who has carried on some extensive experiments along this line, among others.

REDESIGNING A PAIGE ROADSTER

Wants to Use Ford Engine and Put in New Axle Shafts

Lafayette, Colo.—Editor Motor Age—I have a Paige roadster with a two-cycle, three-cylinder engine having a gear ratio of 3 to 1, and 32 by 3-inch tires. I am contemplating putting a Ford model T engine in it, and putting on Ford 30 by 3 wheels. I also wish to put new rear axle shafts and drive shaft in it. Will cold-rolled steel be a suitable material from which to make this?

2—Will a Ford roadster body fit this frame?

3—Will there be any advantage in planing $\frac{3}{16}$ inch off the cylinder head cover on a Ford engine?

4—In remodeling an old car, would it be an advantage in lengthening the wheelbase and setting the radiator back a few inches from the front axle? Also lowering the frame as much as possible?

5—How can the vibration in a Ford motor be overcome?

6—Why does the Chevrolet engine have more power and less vibration than a Ford, yet it has $\frac{1}{16}$ inch smaller bore?—A Subscriber.

1—The axle shafts could be made of this material if it is of a suitable grade.

2—Not very well.

3—By doing this you would reduce the compression space, thereby increasing the compression and probably increasing the power somewhat.

4—Yes, very likely.

5—Fitting aluminum pistons will help, as will also the adjusting accurately of all bearings.

6—We will have to leave that to you. Overhead valves are supposed to give greater power than the L-head.

Getting a Hotter Spark

Stillwater, Okla.—Editor Motor Age—Would it improve the spark in a low-tension Splitdorf ignition system to insert an extra secondary coil between transformer and distributer of magneto? If so, what would be the limit to size of coil to give best results? Would the coil out of a Splitdorf vibrator coil answer? Please give me all information you can on this subject. My object is to get a hotter spark.—A Reader.

1—No. Nothing would be gained by adding another coil. If you want a hotter spark, possibly you can obtain it by having the magnets of the magneto remagnetized. They may be weak, thus causing a weak spark.

WHY WATER-COOLED AERO MOTOR?

Reader Thinks Air-Cooled Engine Should Show at Its Best

Oklahoma City, Okla.—Editor Motor Age—Will you please answer the following questions through the Reader's Clearing House columns?

1—Is not the Park counterbalanced crankshaft the same as that used by Hudson? The cuts look the same. Could not other cars use it? They were advertised for sale in Aerial Age, March 20.

2—Why do the majority of aeroplane builders use a water-cooled engine? If the air-cooled engine is a success, it seems to me that in an aeroplane it would show to its very best advantage. Also in an aeroplane, weight is an important item. Here again is a point for the air-cooled engine, being minus heavy radiators, water, etc. There must be some real reason. I am speaking of standard designed engines, not rotary, such as Gnome.

3—The Mercer engine develops 72 horsepower at 1,800 revolutions. What is this engine's maximum horsepower? Maximum revolutions? Would like the same information about Packard.

4—Are all rivets made of steel marked simply steel rivets? Or is there such a thing as hard-steel rivets and soft-steel rivets?

5—Is a Mercer stock car guaranteed for 80 miles an hour? Is this not America's fastest stock car?—Dexter Renaker.

1—The counterbalancing principle of the Hudson shaft is different from those

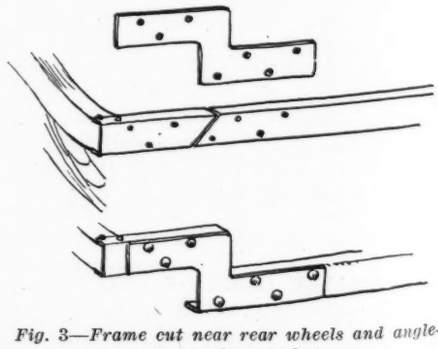


Fig. 3—Frame cut near rear wheels and angle-iron splice made

in which all the weights are of the same size and shape, as in the case of the Park cut you refer to. In the latter case, the counterweights are forged to the shaft and are all the same. In the Hudson design the weights are of different sizes to balance the inertia forces, and are bolted to the shaft. The average counterbalanced shaft takes care of the forces set up by reciprocating parts, but it is the inertia forces which Hudson looks out for. A detailed description of the principle of the Hudson shaft appears on page 32 of the January 20 issue of Motor Age. The Park shaft is for general use, but the Hudson is patented.

2—While there are a great many air-cooled fixed-cylinder aeroplane engines, as for example, the Curtiss and the Renault, the present war has demonstrated the greater advantage of the light type of motor car engine for aircraft use. The reason is that since the air-cooled engines, as a rule, use more oil and gasoline, they necessitate the carrying of large tanks if long flights are to be made. This extra tank weight makes them heavier than the light type of motor car engine where long flights are to be made. Thus the conclusion is reached that while the air-cooled engine is good for speed work, such as scout duty, the water-cooled type is better for long flights and greater reliability.

3—About 80-90 horsepower, with the maximum speed in the neighborhood of 2,800 r. p. m. Packard's twelve does very close to 100 horsepower at 2,700 r. p. m.

4—Rivets are made of different kinds of steel to meet requirements. If it is a rivet that is put in hot, it must of necessity be soft as the heating to redness anneals it.

5—The Mercer speed guarantee is 80 miles per hour. There have been no stock car races by which this could be determined.

UNUSUAL DIFFICULTY IN STARTING

Ford Owner and Repair Men Unable to Diagnose Cause

Washington, Ill.—Editor Motor Age—I have a 1914 model T Ford touring car and have driven it about 1,200 miles. The valves have been reground, valve stems have been properly adjusted, new cylinder rings have been put in, cylinders are as smooth as glass, the compression is good, but cannot start the car, when the engine is cool, without pouring hot water on the carbureter and manifold. Have put on new tested carbureter, new manifold, including new gaskets. After the car was overhauled it would go up a moderate incline on high at less than 5 miles per hour and run perfectly smooth, and without being touched it has developed the above peculiarities.

I have had the car looked over by eight or ten of the best garagemen in the vicinity, and they tell me they never saw or heard of a car in like condition that acted that way.

When starting, if it is a little cool, the engine will choke down sometimes after running a mile or so, and frequently will not pull on high for 5 or 10 minutes. When the engine is balking, refusing to start without hot water, it does no good to remove the spark plugs and prime it.—C. W. Gilbert.

1—From what you say we would ascribe the trouble either to improper carbureter adjustment or faulty ignition. Possibly the timer is dirty or out of adjustment, or the carbureter is set for too rich a mixture, or both.

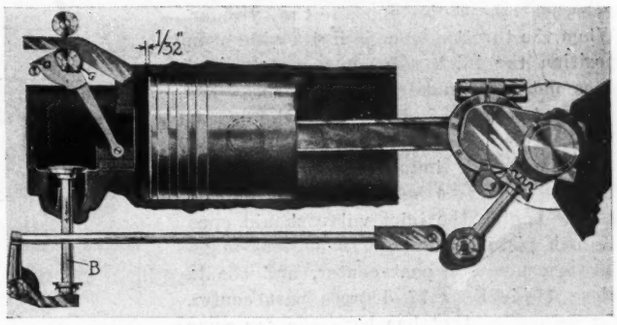


Fig. 4—Diagram showing timing of the one-cylinder Cadillac. The exhaust valve B should be entirely closed when the piston is 1/32-inch, or 10 degrees, on fly-wheel travel after having passed rear center

FACTORS IN GAS CONSUMPTION

Both Bore and Piston Displacement Figure in This Equation

Brock, Neb.—Editor Motor Age—What are the different methods of rating the horsepower of a motor and how is each determined?

2—Upon what rating is the Hudson Super-Six and the Buick 55 based?

3—What is the bore and stroke of the Hudson Super-Six?

4—In regard to these two things, which governs the gasoline consumption of a motor, the piston displacement or the bore?—Earle Cayell.

1—There is only one standard rating, that being the N. A. C. C. rating. Of course, in order to determine the actual horsepower a motor should be given a dynamometer test. This is: H. P. = $\frac{D^2N}{2.5}$ at 1,000 feet per minute piston speed, where D is the bore in inches and N the number of cylinders.

2—Both could be rated by the N. A. C. C. formula, but in order to tell just what power each will give it would have to be tested. The advertised horsepower of these engines is based upon their dynamometer tests.

3—3½ by 5 inches.

4—The gasoline consumption of a motor depends upon the combination of a large number of design factors, each of which has its effect. Other things being equal, the greater the piston displacement the greater the fuel consumption. As the piston displacement increases with the square of the bore, the latter factor affects the consumption materially.

TIMING A ONE-CYLINDER CADILLAC

Setting Explained—Gearless Differential Shown in Diagram and Described

Richmond, Ind.—Editor Motor Age—What firm manufactures the Tillotson carbureter?

2—What causes the intake manifold to sweat if the carbureter used is too small?

3—Show by diagram how to set the timing gears of the old single-cylinder Cadillac.

4—Show by diagram and explain gearless differential?

5—What is the object of the series winding in the Gray & Davis generator shown on page 80 of the Chicago show issue? It looks to be in series with the battery circuit only.

6—If the reduction ratio of a car is 4 to 1 in high, then when thrown in low would the ratio be 8 to 1, providing one gear in low was twice the size of the other?—Reader.

1—Tillotson Carbureter Co., Toledo, O.

2—Condensation and evaporation of the fuel on the sides of the manifold.

3—Referring to Fig. 4, the exhaust valve B should be entirely closed when the piston reaches $\frac{1}{32}$-inch or 10 degrees of fly-wheel travel after having passed rear center. If a motor has been taken down, care must be exercised in reassembling to see that the gear on the crankshaft and the gear on the camshaft are meshed in the correct relative position. To do this, turn the fly-wheel and crank shaft so that the crank pin will be in the same horizontal plane with the center of the crank shaft, having the crank pin extending back toward the cylinder of the motor. Then mesh the valve gears so that the commutator cam which is in the end of the commutator shaft will be in a perfectly vertical position, that is, that it points straight up or straight down. If these gears are not meshed correctly, even if they are only one tooth out of the way, the motor will not work properly.

The timing of the inlet valve, both as to the time it opens and closes, constantly changes every time the position of the throttle lever on the steering staff is changed. For slow speed work, when the throttle is only opened a few notches, the inlet valve opens late and closes early

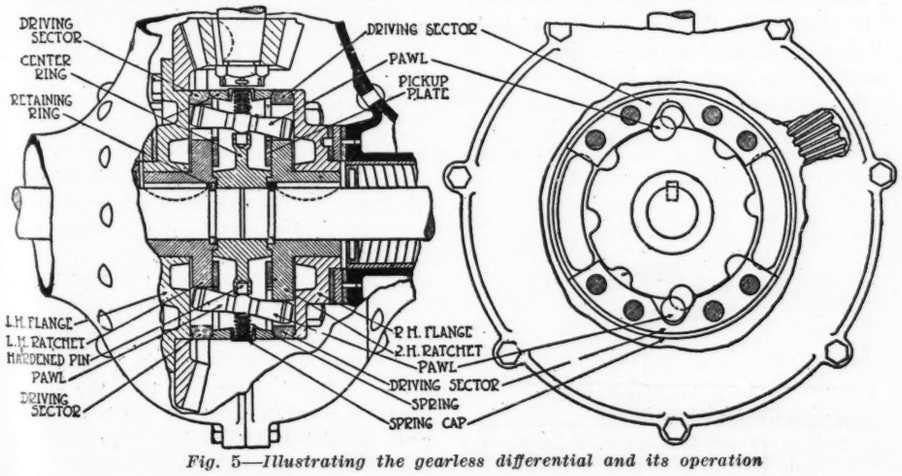


Fig. 5—Illustrating the gearless differential and its operation

very near the center opposite the cylinder. When the throttle lever is in its wide open position the inlet valve opens early, and does not close until the crank shaft has returned about 77 degrees or the piston has traveled about 1½ inches on the return stroke. In timing the inlet valve, the throttle should be held wide open, and on a new engine the inlet valve should open ⅛-inch piston travel or 12 degrees angular measurement past center, and should close 1½-inch or 77 degrees past center. On an engine that has been run for some time the inlet will probably open from ⅛-inch to ⅜-inch past center. An engine in this condition will be considered out of time. This may be corrected by disconnecting the push rod at the eccentric and putting in a new shim between the eccentric and the push rod. A shim .01 inch or .0156 inch larger is usually enough to put the valve in proper time, and in doing this it may be necessary farther to elongate the holes in the push rod.

4—The gearless differential is shown diagrammatically and in section in Fig. 5 The operation is as follows:

The left-hand differential flange, to which differential driving gear is bolted, the right hand flange, the center ring, and the right and left driving sectors, two at top and two at bottom, are all bolted together, making this whole outer differential housing a unit. The right and left ratchets, which are keyed to their respective axle shafts, are independent and free to rotate inside of housing. The two round members with knobs at ends and center, placed crosswise, are the walking beams, or pawls, and are the interlocking mediums between the driving sectors and ratchets. The illustration shows the right hand end of the top pawl in the tooth of the right hand ratchet and being driven by the contact face of the driving sector.

This drives the ratchet forward through the center of the end of the pawl. In the same manner the left ratchet is driven forward by the lower pawl, which is engaged at its left end. Thus both wheels are driven forward positively and neither can spin, as with the gear differential.

To drive backwards, the differential housing starts to move to the left and pushes the end of the pawl out of ratchet tooth, which throws the opposite end of the pawl down into the tooth of the opposite ratchet. Contact face of reverse driving sector engages and drives the wheel backward. The lower pawl acts in the same manner. In turning a corner, imagine that the car is being driven forward and is to be turned to the left. The right wheel starts to revolve faster than the left and causes the right hand ratchet to move faster than the differential housing, which can only go as fast as inner or slower moving wheel. The ratchet pushes the end of pawl out of its tooth, thus allowing the ratchet to have a free movement forward. As soon as the corner has been made and both wheels are revolving at equal speeds, the spring at the center of the pawl pushes the end of the pawl back into engagement and the drive is again taken up by both wheels.

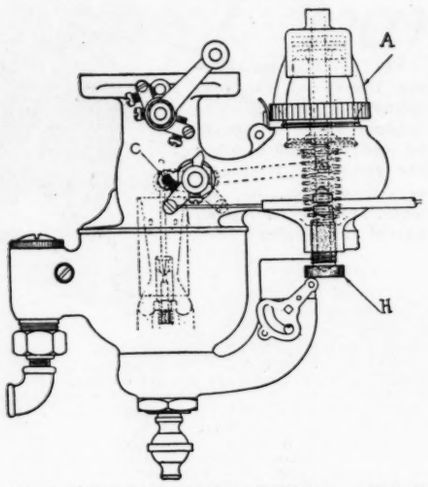


Fig. 6—Section through a Schebler, model R, carbureter

When the wheels propel through the driveshaft, as in case of coasting or braking through it, both ratchets start to turn faster than housing, and push the engaged ends of pawls out of engagement and the opposite ends into driving position in the opposite ratchet teeth, thus causing the ratchets to propel the driveshaft.

5—The system referred to is a two-unit type, and the generator is compound wound. Therefore it has both a series and a shunt field wound on the poles. The motor is a series wound unit, and its winding is indicated in the diagram.

6—Yes.

WHY HUDSON USES SMALLER TIRES

Narrower Section Said to Be More Lively for Speed Trials

Tacoma, Wash.—Editor Motor Age—What advantage, if any, was gained in the recent speed trials of the Hudson Super-Six by using 34 by 4 tires instead of the regulation size 35 by 4½?

2—If extra air is admitted into the intake, is the revolutions per minute speed of a motor increased? If so, to what extent? For example, by the use of a pet-cock in the intake?

3—What is the gear ratio, on high, and the maximum speed of the 1914 Hudson 6-40?

4—What percent of power is lost, if any, in a six-cylinder motor, because of its not being properly balanced?—Byron S. Foreman.

1—Because of the slightly narrower section, the smaller tire has been found to be slightly livelier than the 35 by 4½ for speed work, hence the Hudson company took advantage of this slight factor. Such a change, however, should not have any appreciable results upon the possibilities of the car one way or the other.

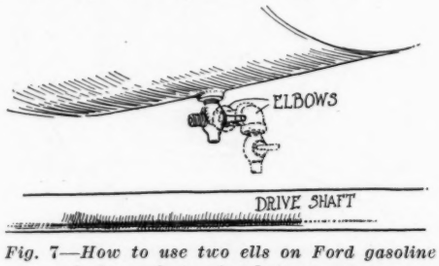


Fig. 7—How to use two ells on Ford gasoline drain cock to give better access

2—There is no advantage of admitting extra air, providing the carbureter functions as it should. In other words, the carbureter is supposed to vary the amount of air in proportion to the gasoline to meet the increase of the speed. Nearly all carbureters have auxiliary air valves of some kind that admit more air as the engine runs faster.

3—The gear ratio is 3.75 to 1, but we are unable to state definitely what the maximum speed of the car is. When it left the factory and was in generally good condition it would do better than 60 miles per hour.

4—That depends on the engine.

MANY FACTORS CAUSE VIBRATION

Six Is in Theoretical Balance, While the Eight Is Not

Des Moines, Ia.—Editor Motor Age—What is the S. A. E. horsepower formula, also the formula in which the stroke is taken into consideration?

2—I understand that there is vibration or whip, as it is sometimes called, in the crankshaft of sixes which is entirely eliminated in the eight and is present to a considerable extent in twelves, which to overcome I understand the Packard company uses what is called a vibration damper on the flywheel. If this is true, why so much more in twelves than in a six? What causes it?—George W. Curtis.

1—The S. A. E. formula, rightfully the N. A. C. C., is:

$$\text{Horsepower} = \frac{D^2N}{2.5}$$

, in which D is the cylinder diameter and N is the number of cylinders. This takes the stroke into consideration in the constant 2.5, the formula being based on 1,000 feet piston speed per minute.

2—Because of a greater number of power impulses the eight is smoother on this score than a six, and a twelve should be even better than an eight, but there are so many factors on which vibration depends that the greater continuity of power in one type over another is often offset by discrepancies elsewhere. However, the six is in theoretical balance while the eight is not, it having a horizontal component, which is practically negligible in a well-designed eight. The twelve is also in balance.

Has Trouble With Steering Gear

Philipsburg, Wis.—Editor Motor Age—I have a Maxwell Mercury roadster 1912 and I do not get the amount of power I should. Compression seems good and it hits right. Kindly adivse me what to do.

2—The steering gear in this car has too much play, and I have just put in a new worm and new bushings and it does not seem to take up any of the lost motion. Please advise what to do and oblige.—James G. George.

1—It would be next to impossible to say what would give you more power, without more definite information as to what seems to be the trouble with the engine. However, you might check up the ignition to see that the timing is correct; make sure you have the best carbureter adjustment you can secure; see that the cooling system is in good shape and that the engine does not overheat; put all the bearings in good condition. If desired, you could fit some kind of non-leak piston rings.

2—Possibly some of the steering connections beyond the worm and gear are too loose. Examine the reach rod for play; see that the cross rod is not loose; inspect the steering arm.

DOES NOT UNDERSTAND FORMULA

Cannot Figure Out Horsepower Differences in Various Motors

Raymond, Ill.—Editor Motor Age—I am puzzled in regard to the horsepower of different engines. Some of similar stroke and bore are listed widely in horsepower. Do different companies have different methods of computing horsepower? Can one engine have more horsepower than another, if same number of cylinders and stroke and bore are the same? If so, what determines the horsepower?

2—What is the S. A. E. rating?

3—Please tell me how I can figure the power of one motor as compared with another.—D. E. Guthrie.

1—Yes, one engine of the same bore and stroke as another may be much more powerful, or it may show to considerably less advantage. The design of the parts such as valves, cams pistons, crankshaft and all reciprocating parts might have their effect upon the power developed. It might be considered that the actual horsepower possibilities were the same in two engines of same bore and stroke, but one might absorb more of this power internally than the other, thus delivering less. The design and workmanship determine the power output.

2—This is the rating obtained by the following formula:

$$\text{Horsepower} = \frac{D^2N}{2.5}$$, where D is the cylinder diameter and N the number of cylinders. This is now termed the N. A. C. C. rating, rather than the S. A. E. rating, and represents the horsepower developed at 1,000 feet per minute piston speed, or travel.

3—There is no formula that will give you the actual horsepower of one motor as compared with another, as the above will show you, and the only absolutely accurate method of telling the power of a motor is by dynamometer test.

ADJUSTING SCHEBLER CARBURETER

Reader Wants Speed of Overland Six and Data on Hudson

McPherson, Kan.—Editor Motor Age—We have a 1916 model Overland six which works improperly at high speed. The motor works perfectly until a speed of about 40 miles per hour is reached and then begins misfiring so that higher speed is impossible, although the throttle is little more than half open. The valves have been recently ground and the powerplant is in perfect condition. The timing has not been changed. The trouble is apparently in the carbureter adjustment. Several mechanics have attempted adjustment without success. Will Motor Age kindly give high and low speed adjustments of the model R Schebler?

2—What should be the maximum speed of the car on good roads or pavement?

3—At how many revolutions per minute will the motor be turning at this speed?

4—Is it possible that the Hudson Super Six is faster than the Mercer? Their recent tests seem to show that it is.—W. T. Husband.

1—Referring to the diagram of the model R Schebler, shown in Fig. 6, the adjustment is principally of the air valve A. Turn the air valve cap A clockwise until it stops; then turn back in the opposite direction one complete turn. Open the throttle about one-eighth to one-quarter, and then start the engine. After the latter is warmed up, turn the valve A anti-clockwise until the motor runs properly. Next advance the spark three-quarters of the way on the quadrant, and if the engine backfires on quick acceleration by suddenly opening the throttle, turn the adjusting screw H up until the action is satisfactory.

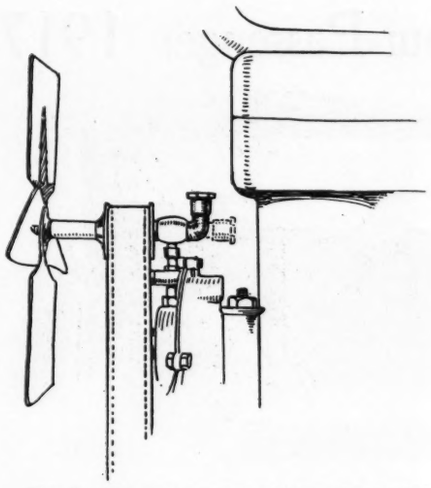


Fig. 8—Showing how an ell may be used to give better access to grease cup on Ford fan belt shaft

2 and 3—We do not know exactly, but it probably will do better than 55 miles per hour if in good condition.

4—According to the A. A. A. tests the Hudson Super-Six has the stock chassis record.

Advances Carbon Removing Plan

Timewell, Ill.—Editor Motor Age—I have thought of a plan to remove carbon from motors and would like to know if it would be practical. It is to connect a rubber tubing to an oxygen tank or generator and put the other end into the air intake of the carbureter and run the motor with the oxygen turned on. Would this remove the carbon?

I saw in a recent issue of Motor Age a way to make oxygen by filling a short section of gas pipe with certain chemicals and heating it with a blow torch, but have lost the copy. What chemicals were used and in what proportions? Would there be any vaporized acids in this oxygen that would injure the motor?—R. E. Arvin & Son.

1—The plan you mention for carbon removal is not practical. You would not be directing the flame on to the carbon, but would simply damage the manifold, to say nothing of the danger of serious explosions due to bringing a flame close to the gasoline. We do not recall the article on homemade oxygen apparatus, and believe it would be more satisfactory if you were to procure the proper apparatus from a supply firm.

Communications Received and Inquiries Answered

J. W. Collinge.....Corona, Cal.
J. B. Herold.....Shreveport, La.
Dexter Renaker...Oklahoma City, Okla.
Dacre Dunn.....Center, Colo.
A Subscriber.....Lafayette, Colo.
A Reader.....Stillwater, Okla.
Earle Cayell.....Brock, Neb.
Reader.....Richmond, Ind.
Boyd Hubbard.....Adair, Ia.
Byron S. Foreman.....Tacoma, Wash.
C. W. Gilbert.....Washington, Ill.
George W. Curtis.....Des Moines, Ia.
James G. George.....Philipsburg, Wis.
W. T. Husband.....McPherson, Kan.
J. G. Hoffman.....Kewanee, Ill.
D. E. Guthrie.....Raymond, Ill.
R. E. Arvin & Son.....Timewell, Ill.
Russell B. Hopkins.....Cincinnati, O.
A Subscriber.....Eli, Neb.

No communications not signed with the inquirer's full name and address will be answered in this department.

FAULTS OF EQUIPMENT MOUNTING

Tells How Two Fitments on a Ford Might Be Better Placed

Cincinnati, O.—Editor Motor Age—Speaking of refinements of detail needing attention by manufacturers, did you ever notice the gasoline tank drain cock on a Ford? It is an inch and a half above the drive shaft housing and directly over it. One can not drain the tank and save the gasoline without fooling around with a rubber tube, and also if there is a heavy load carried, a rough road will cause the drive shaft to pound on the pet cock with danger of springing a leak around the gasoline connections. Two ⅛-inch brass ells permit the moving of the pet cock a couple of inches to one side of center which not only gets it out of the way of the drive shaft, but allows the gasoline to drain directly into a bucket or can. See Fig. 7.

There is a grease cup on the fan bearing. The fan belt after a month or two stretches and the slack is taken up with an adjusting stud bolt. This throws the grease cup to within ¼ inch of the off-set at front of engine and to fill grease cup necessitates the loosening of the adjusting stud bolt as well as its lock nut, permitting the dropping of the fan supporting bracket in order to remove the grease cup for filling. A short ell at this point would enable the cup to be filled regardless of position of fan supporting bracket. See Fig. 8.—Russell B. Hopkins.

Gets Peculiar Spark Trouble

Eli, Neb.—Editor Motor Age—I would like Motor Age's advice about a Maxwell magneto, 1916 model. Sometimes the motor runs all right, then begins to miss. In cylinders 2 and 3, on being tested, no spark, but good spark in 1 and 4, at other times very little spark to 2 and 3 and 1 and 4 is all right. Two experts looked it over, one said magneto was all right. the other said he did not know what was the trouble. Breaker seems to look all right and distributer is clean. It looks to me like trouble between breaker and distributer points 2 and 3. If breaker would work all right for cylinders 1 and 4, would it not work 2 and 3?—A Subscriber.

1—Most likely the magneto magnets are weak, resulting in an intermittent or weak speark. Have them remagnetized by an experienced magneto repairman and the trouble should be eliminated.

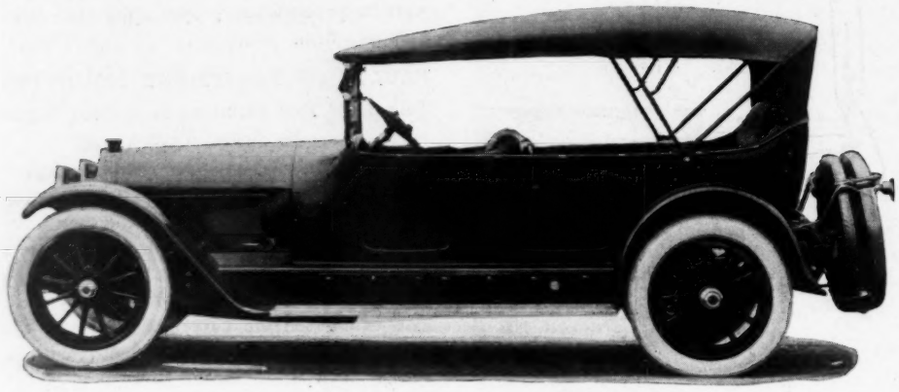
Using Car Without Battery

Center, Colo.—Editor Motor Age—In the 1916 Reo model R which uses the Remy ignition system, in the event of the storage battery being out of commission, would it be feasible either to connect a light fuse across the battery terminals, or to connect a resistance cell across them, thus getting the use of the car while the battery is being repaired? Being situated over 100 miles from the nearest battery service station, it is necessary sometimes to wait several weeks for a repair. This, of course, is not a frequent occurrence, but sometimes becomes necessary.—Dacre Dunn.

1—Neither of the things you suggest could be done satisfactorily, but you could lift the brushes out of contact with the commutator.

Locomobile Has Four-Passenger 1917 Special at $4,750

New Model on Chassis of the 38—Higher Prices for Coming Season



Locomobile 48, which is lower and longer than its predecessor

LOCOMOBILE chassis and bodies for 1917 follow much along the lines of the last 6 years except for detail changes intended to give the final touch of refinement to cars which are designed specifically to be the last word in beauty and luxury.

At first sight the two sixes which are now in their seventh and sixth years, seem little changed as compared with a year ago. A detail study, however, shows perhaps sixty alterations which, although none are fundamental, combined to make the Locomobile for the coming season a product improved in many particulars as compared with its predecessor.

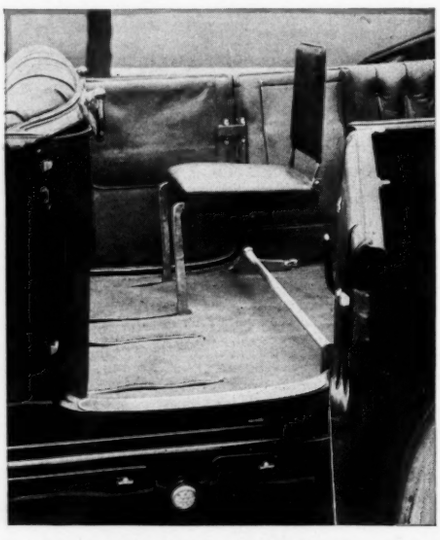
Lower and Longer

Broadly speaking, Locomobile cars for 1917 are more beautiful in appearance because they are lower and longer. They are more easy-riding, due to a rearrangement of the suspension and they are faster, having better acceleration and a higher maximum speed, due to a new carbureter, lighter reciprocating parts and a better balanced motor. Taking the car as a whole in every feature of value to the owner, the 1917 Locomobile is a better car than that of 1916, due simply to an attention to detail which renders every step in manufacture a matter of painstaking care on the part of each individual workman.

These refinements have been accompanied by a change in price due to the increased cost of material. The seven-passenger on the larger six, known as the 48, sells for $5,400. The 38 is $4,600 in the seven-passenger size. The other cars listed for 1917 are six-passenger bodies on both the 38 and 48 at the same price as the seven-passenger, a limousine selling for $5,600 on the 38 and $6,500 on the 48, a landaulet at $5,700 on the 38 and $6,600 on the 48 and berlines selling for $5,900 on the 38 and $6,800 on the 48. In addition there is a four-passenger special car at $4,750 on the 38 chassis. This four-passenger job is a new product which has been incorporated into the standard line and only a limited number of this type will be constructed.

Mechanically a number of detail refinements will be found throughout the car, although none of them ranks as radical. Probably the change having the greatest effect on the car is the rearrangement of the spring suspension, in which the front springs have been increased to 40 inches in length, whereas they were 38 inches. They are considerably flatter and are a factor in giving the car a lower appearance. The rearrangement of the front spring mounting has also had the effect of shortening the wheelbases 1 inch on both the 38 and 48 cars, making the smaller car 139 inches and the larger 142 inches. This shortening of the wheelbase is not perceptible since owing to the fact that the cars are lower they give the impression of being longer and the shortened wheelbase has not in any way decreased the body space.

Another factor in giving the car a lower appearance is that the rear spring supports are lower than they were on the previous models and the front axle is swept in a continuous curve from steering knuckle to steering knuckle, instead of having an abrupt drop. To balance the lowering of the front of the car the rear springs have been made very much flatter, although of the same dimensions as previously. The lowering of the spring pads on the front axle has totaled 2 inches, but owing to the curve of the axle no reduction in clearance has been made. Changes in the axle have necessitated other changes in the car, particularly in the pivot tie rod, which has been flattened out to harmonize with the curve of the front axle. Again, in changing the tie rod it has been necessary to shorten to pivot steering arms. At the rear an additional 2-inch kickup in the frame takes care of the lowering of the front end of the car.



View showing how auxiliary seats are arranged in the new Locomobile. Note the light just below door

All the changes above outlined have given a total lowering of the frame of the car of 2 inches, but this is not all that has been done to produce a low appearing design. The body lines themselves have been altered so that the total height of the body has been reduced by about 3 inches. These changes have been effected so that the continued line of the bonnet now harmonizes with the lines of the car, considerably flattening out the curvatures at the top of the body.

Radiator Top Altered

In carrying out this alteration in lines the shape of the top of the radiator is altered, the curve being flattened to harmonize with changes in bonnet and cowl. The bonnet is altered in size and shape, the width at the rear being increased while the horizontal lines at the side are raised 2 inches to match the change in the radiator and the top curve has been flattened for the same reason. The upper curved surface of the cowl is flattened and the instrument board is brought nearer to the driver. This series of changes has been carried back through the windshield on which the curve at the lower part is changed to meet the curvature of the cowl and the windshield is now supported by special side braces which are built up inside the cowl and are practically invisible.

Probably the most radical changes are in the starting system, of which the motor has been entirely redesigned and is an entirely enclosed unit. In place of the former double reduction of approximately 35 to 1 it now has a reduction of 10 to 1, giving a much lower armature speed. The full end switch is placed on the rear end of the armature shaft and is entirely enclosed. It is quieter than the former model and is now located on the left side below instead of the right side above the crankshaft.

An interesting change in connection with the installation of the starting motor is the fact that the teeth on the flywheel ring

gear are now cut on a spiral at an angle of 13 degrees instead of being a straight spur gear as heretofore. This gives a silent and more positive engagement.

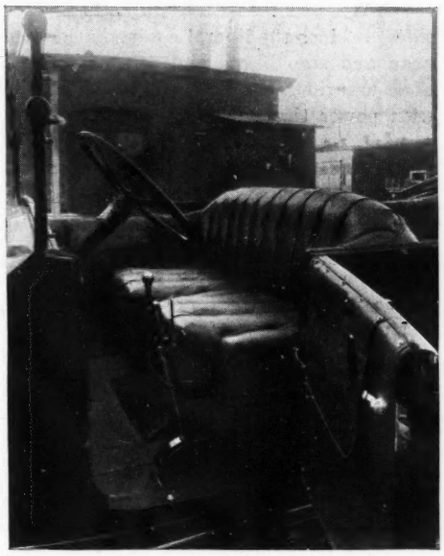
The generator is now of the voltage control type and has been reduced to conform to existing 6-volt standards. The voltage of the 1916 generator was 7 volts. Another electrical change is the installation on all models of the dual Eisemann magneto instead of the type previously used.

Practically exact similarity of design is used for the two Locomobile six-cylinder chassis. They are designated respectively as the N-7 and R-7. The former has a 4½ by 5½ motor and the latter a 4¼ by 5 with horsepower capacity of over 80 and 65 respectively. The wheelbase of the two cars are 142 and 139 and with these major differences. The two chassis are the same throughout save for a few unimportant details.

Locomobile cylinders are T-head in shape, cast in pairs. The cylinders are of gray iron, which has been aged before manufacture. Two rings are used in the pistons with an oil ring at the bottom. This is a change over 1916 when five rings were used. In fact, the whole piston design has been lightened materially, one of the ribs being taken out of the head and the rib around the middle between the piston pin bosses also removed. The inside of the piston is now machined as far as possible, still further reducing the surplus weight and in the weighing process they are checked to $\frac{1}{16}$ ounce.

Tungsten Valves Used

Tungsten valves are employed and these are ground to a true seat at the factory. It is intended with this material that no warpage should take place and the owner will be spared the trouble of frequent grindings. The tappets are also of alloy steel and operate in bronze guides while the rollers are case hardened and operate on hardened pins. A new feature of the valve action is that in the 1917 cars the spring on the intake valve is just as stiff as that on the exhaust. This prevents the possibility of the riding of the valve at the higher speeds which have been rendered possible by the lighter reciprocating parts.



Plenty of room for the driver is given by the novel lever location and wide door

Lubrication is by an internal circulating system and is a combination low pressure feed and splash. The oil reservoir is in the aluminum oil pan at the bottom of the crankcase. The capacity of the 48 is 7 quarts and of the 38, 6 quarts. The gear type oil pump forces the lubricant up through an external pipe which has two connections. The first of these is to the oil feed pipe in the lower half of the crankcase. This has six outlets, which feed the six splash troughs respectively.

The second oil outlet is to the oil-feed pipe in the upper part of the crankcase. This has branch pipes which lead to the seven main bearings, and, at the forward end, the pipe is continued into the timing gear housing. The oil pipe allows the excess oil which is not used through the two outlets to go through a by-pass valve and return to the oil sump in the base of the motor.

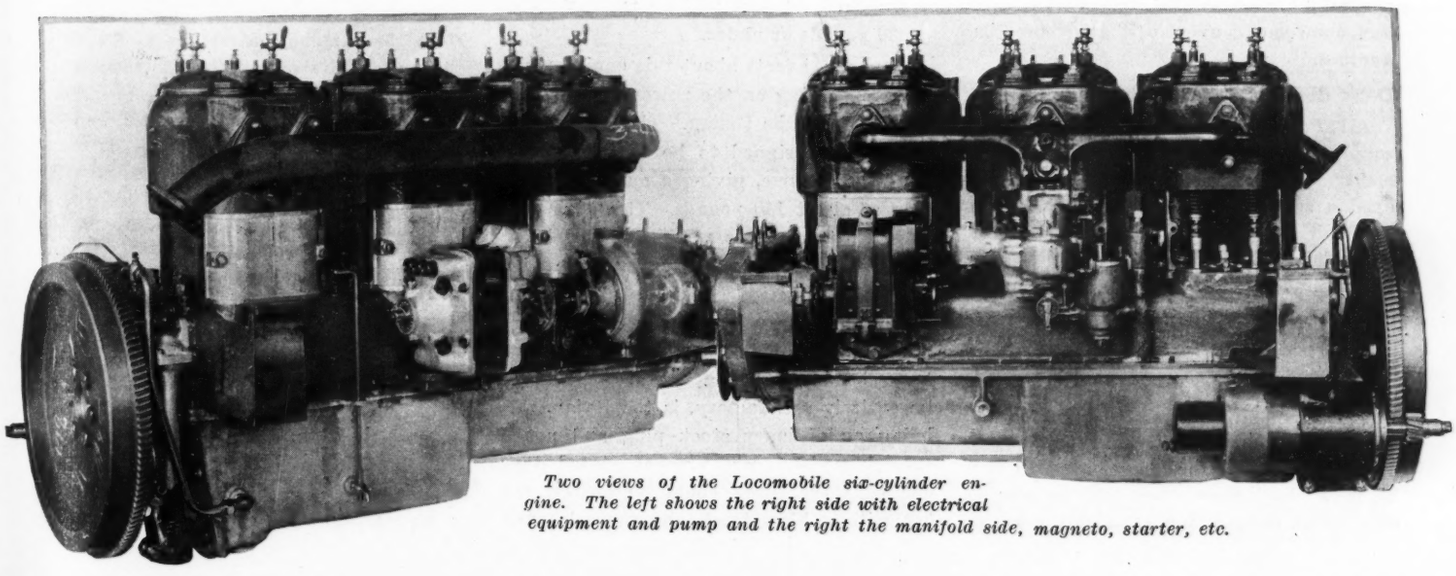
The carbureter is new this year. It is known as the Locomobile-Ball type, being made under the Ball patents. It is a two-stage type with a low speed jet for ordinary running and a high speed jet for wide open throttle. When this jet comes into action an additional air valve is also opened, giving practically an entire secondary carbureter. The carbureter is not waterjacketed, but is provided with a hot-air attachment. An adjustment on the steering column actuates a metering screw which determines the amount of fuel entering the low-speed jet.

A special design of Westinghouse electric lighting and starting system is used on the Locomobile. The generator is a 6-volt unit located on the right side of the motor behind the water pump. It is regulated automatically by a differential field winding and the field winding is made of special wire, which, as the generator becomes warm, the resistance increases, tapering down the output. Single wire system is used.

Starting motor is series wound and is capable of turning the 38 over at about 125 r. p. m. and the 48 at about 115 r. p. m. This is fast enough to start on the magneto. Starting motor engagement is effected magnetically. In the magnetic pinion shift is a powerful electric magnet having a pull-in coil. This becomes magnetized and acts to engage the starting pinion. The engine is first turned over slowly and then rapidly picks up speed and cranks the engine. When the engine commences to fire and speed up the voltage of the generator builds up and the starting motor circuit is opened automatically.

Disk Clutch

The clutch is a disk type with steel disks. Between each pair of disks is a floating ring of fabric. The gearbox is connected to the clutch by a universal. The gearset is a four-speed selective type contained in a manganese bronze case bolted to the frame at four points. The entire upper half is a light-weight cast aluminum housing, which can be quickly removed. The gear ratios are, first, 15.4 to 1; second, 7.39 to 1; third, 5.38 to 1; fourth, direct, 3.85 to 1; reverse, 21.75 to 1.



Two views of the Locomobile six-cylinder engine. The left shows the right side with electrical equipment and pump and the right the manifold side, magneto, starter, etc.

Power is transmitted from the gearbox to the rear axle by a chrome nickel steel propeller shaft having a full universal at the gearbox end and a block and pin type of universal at the rear end. The rear axle is floating, the housing consisting of a hollow steel casting into which seamless steel tubes are forced.

In equipment Locomobiles are particularly complete. The bodies are of sheet aluminum, beaten into shape and fastened to a wooden frame. The instrument panel is located in the hood and the same panel is used on all 1917 models. It is held to the front cowl frame by two bolts at each side. Besides the liberal equipment of tonneau and step lights and other requisites of a luxurious car Locomobiles are fitted with power tire pumps which are capable of pumping up a 37 by 5 tire to 90 pounds in about 4½ minutes with the engine running at 1,200 r. p. m.

The top is a one-man type, which this year has been made very simple to operate. A handle is conveniently fastened to one of the bows and the top can be raised by one person with one hand. A feature of the top is the padding over the bows.

Test Packard Aviation Engine at Sheepshead

(Concluded from page 27)

Another advantage appears when the piston speed is studied since a 4½-inch stroke at the normal running speed of 2,300 r.p.m. gives a piston speed of only 1,725 feet per minute.

A detail which shows up well in the illustration, and yet may appear peculiar, is the design of the intake manifold. This is the result of much experiment and is giving better service than designs which appear to be a theoretical improvement. Mr. Vincent explains the success of this design as follows:

"In an intake the resistance to gas flow comes at the corners or bends and the resistance of the bend is much greater than the resistance in straight pipe. It is thus important that if there be any bends they should all be in the same position relative to the valves served. In this particular manifold the gas rising from the carbureter strikes against the top of the fore and aft pipe where it spreads and the distance from each valve to the main header is the same. As a method of demonstrating the accuracy of carburetion and the evenness of charge obtained with this manifold, the fact may be mentioned that when the engine is run without the exhaust manifold the length of the jet of flame from each cylinder is the same. You could hold a straight edge to the tips of the flames and none would overlap it any more than another."

Delco Starting and Lighting

All Packard aviation engines will be supplied with starting and lighting equipment. For this purpose Delco has developed a special small generator design for the high average speed of aeroplane service. This is mounted accessibly between the cylinder block. Having the generator and a small battery there seemed no need for any other ignition device than the Delco distributer, which has given such complete satisfaction on the stock twin-six. Consequently one of these is mounted at the rear end of the V. As soon as these engines are ready for delivery, which will be in a short time, they will be offered either with the starting and lighting equipment with Delco ignition or without any other electrical equipment but two magnetos. Up to the present the distributer has shown itself well up to the demands made by continued high-speed running.

For cooling, there is a single pump with a double outlet and this is mounted at the front end of the crankcase, having its spindle vertical and a bevel-gear drive from the front end of the crankshaft; there is no thermostat control. The lubrication system is on the same lines as the stock Packard motor, that is to say, each main bearing of the crankshaft is fed with high-pressure oil which is then taken to the crank pins and passes up to the piston pins. The various auxiliaries are fed independently and the two camshafts are fed from inside. One of the oil pipes for this purpose can be seen in the illustration. Oil escapes through the hollow camshaft at each bearing and the parts of the casing in which the cams lie, together with the roller ends of the rockers, are filled with oil to a pre-determined level. All surplus passes out at the back end of the case, whence it returns to the crankshaft, lubricating the camshaft driving gears as it goes. The oil pressure being used at present shows 40 pounds gauge, but it is thought that there is no need for so high a pressure. A test will be made with oil at 30 pounds or under.

Two other facts about this engine which have a bearing on the power are the compression and the timing. The compression volume is designed to be 17 per cent of the total volume, giving a gauge compression of about 110 pounds. This high compression pressure is rendered possible by the small size of cylinder and the high thermal conductivity of the pistons, but it has a very destructive action on the spark plugs. The plug, with which all the tests have been made and which appears to be entirely satisfactory, is the Rajah, this being an ordinary stock plug and not a special model. Mr. Vincent stated that one of these plugs could be heated red hot with a blow torch and then dropped into cold water without any damage to the porcelain.

The timing is quite ordinary.

Inlet opens 5 degrees after top center.
Inlet closes 40 degrees after lower center.
Exhaust opens 47 degrees before lower center.
Exhaust closes 5 degrees after top center.

It will be noticed that the exhaust closes and the inlet opens at the same instant, but there is no overlap.

It is well understood that one of the advantages of four-valve construction is that the smaller valves need but light springs. This is particularly true with the very small parts in the Packard engine since the valves are so light that the spring pressure required is quite small. Actually the pressure of the spring when the spring valve is open is only 52 pounds, this falling to 38 pounds when the valve is closed.

A few words may be added about the chassis in which this engine is being tested for it is no less remarkable a piece of work in its way. The gearset bolts to the crankcase and the steel flywheel contains a single disk clutch of very light construction. Back of the gearset there is a large and very powerful transmission brake, this being metal to metal as are the rear wheel brakes, all the shoes being cut out from high tensile material so as to obtain great rigidity with minimum weight. The rear axle has a chrome-nickel steel housing in two parts, split vertically in the center, and each half is turned from a solid billet of steel. It is stated that each of these halves cost over $350, bringing the price of the axle to $1,000 or over. The steering gear has been specially designed also and, like the rest of the chassis, is made of the strongest steel than can be obtained. The steering worm housing sets in one of the crankcase arms in a very neat way.

Body Easily Removed

There is no need to say anything about the shape of the body, as this is sufficiently described by the illustrations. Its method of attachment, however, is not so obvious. At the tip of the tail a small socket will be noticeable. This contains a bolt which holds the top part of the body in place. At the front end of the cowl there is a pair of hinge clips. The pins for these form the attachment for the two ends of the rear hood straps. Thus, to remove the body the hood strap is taken off, the two hinge pins unhitched and removed, and the single bolt at the tip of the tail is taken out. The body can then be lifted off complete. To give it ample lateral security a steel sill is carried along the top of the frame, the body setting into this, and there are a number of dowel pins along each side.

The chassis altogether represents a distinct advance upon the best work which Europe has so far produced. The Packard engineers have been studying European racing machines for years and in the Packard chassis it is possible to trace points of similarity to various well-known foreign racing machines. The best principles found

Novel Features Are Found in Schofield Sleeve-Valve Motor

Valves Proper Are Inverted Cylindrical Cups Pierced by Rectangular Openings, Which Form Ports

A ROTATING sleeve motor which incorporates a number of novel features is being developed by George L. Schofield, of Kansas City, Mo. The motor does not differ from ordinary practice anywhere in the assembly between the bottom of the crankcase and the top of that part of the cylinder swept by the piston. Above this point, however, incorporated in the superstructure necessary with this motor is the valve action. The valve proper is an inverted cylindrical cup pierced by rectangular openings which form the ports. Each of these valves is carried on a vertical stem or shaft which is rotated by a single longitudinal shaft running over the entire motor structure.

Referring to the sectional and diagrammatic illustrations herewith, it will be noted that these inverted cylindrical valves rotate within an annular space provided for them above the main cylinder. The space within the valve chambers forms the combustion space of the motor, so the condition that exists at the combustion space is of smaller diameter than the expansion chamber in the cylinder.

Walls Pierced by Three Ports

Referring to the plan views, it will be seen that the interior wall of the combustion chamber is pierced by three ports, one for intake, one for exhaust and the third at the spark plug opening. The rotating valve itself contains only one port and when this single port is in line with any of the three in the interior wall of the combustion chamber, as at G, either exhaust, intake or firing takes place.

As the valve is rotated from the longitudinal shaft by means of the bevel gears A, the port comes in line with the intake opening, allowing a charge of gas to pass in through the opening in the rotating valve, which is shown in solid black in the sectional illustrations. This charge then passes through the opening in the inner wall of the combustion chamber and at the proper time the intake is closed when the valve port no longer registers with the intake passage.

The piston then moves up on its compression stroke, while the valve is rotating, until when the firing point is reached the valve opening registers with the spark plug opening, and firing occurs. Immediately after this takes place the spark plug is cut off from contact with the hot gases and the valve moves around until it finally registers with the exhaust port, allowing the gas to escape into the manifold and the pressure in the cylinder to fall to atmospheric.

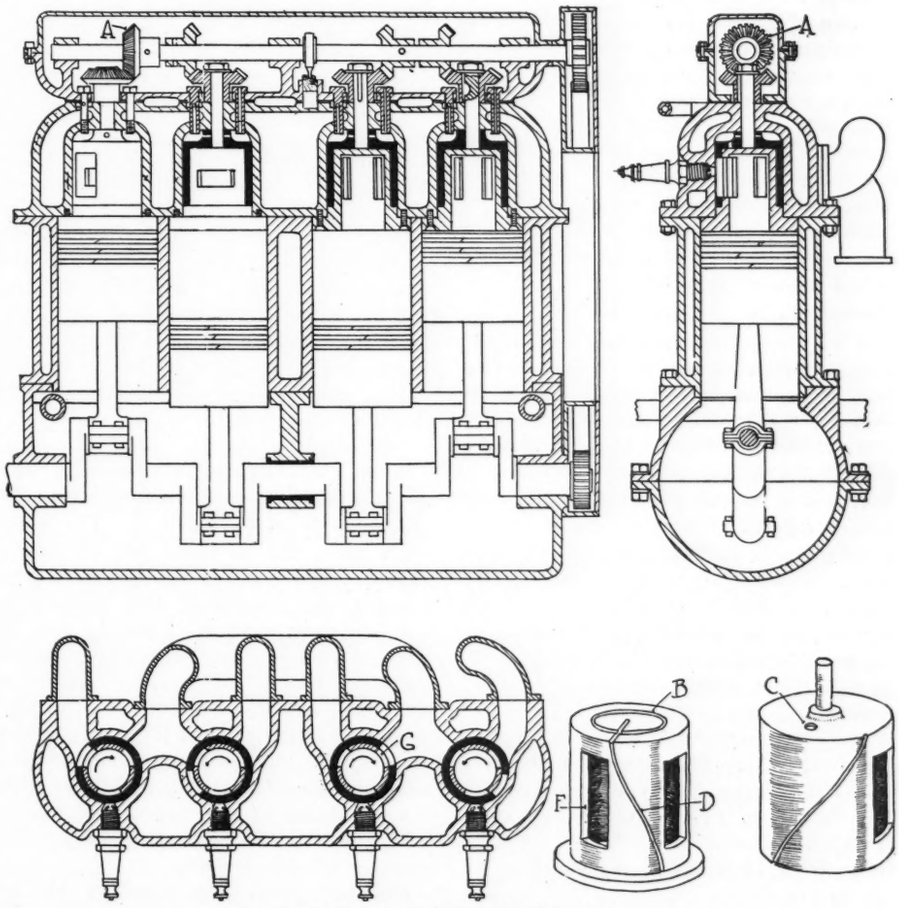
The valve must be lubricated on two surfaces, since it rotates within an annular passage, and this is accomplished by a pressure feed, which forces the oil down on to the top of the valve, where it enters a groove cut down along the side of its cylindrical surface, thus taking care of the exterior wall. There is also a hole C cut in the top of the valve, allowing oil to enter into the groove B. From here it is led through the groove D to the inner surface of the valve wall, providing a lubricating film at this point.

The construction used with this motor allows the entire head to be taken off, exposing the cylinder walls. The internal valve member F is bolted to the superstructure, and is removed with it. The advantage of accessibility is claimed for this construction.

As regards balance of the valve, this is obtained by the arrangement of the ports, which permits equal pressure on all sides. The engine is also said to run cool, due to the great amount of water space surrounding the combustion chamber and the fact that the gas is allowed to expand into a separate chamber below. Thus, there is a much greater amount of water around the combustion space, where it is needed, than there is around the expansion chamber, where there is a desire to conserve the heat to as great an extent as possible.

The arrangement for the valve drive is simple and in the drawings consists of a silent-chain drive to the longitudinal shaft above. In order that the engine may be balanced mechanically, the adjacent valves rotate in opposite directions. There is no reciprocating action in any of the valve parts, the entire cycle being accomplished by rotation.

A study of the details of construction in the illustrations herewith shows the valve-driving mechanism to be mounted at one end of the motor taking the silent chain drive from the end of the crankshaft. The longitudinal valve shaft is carried on three bearings. The lubricating pump is operated from the valve shaft, supplying oil under pressure to the oil-distributing grooves in the valves. The entire valve drive mechanism operates in a bath of oil, allowing the top of the motor containing the bevel gears to act as a reservoir. The ordinary oiling system of the motor is not interfered with in any way, and, if desired, a different lubricant could be used for the valve action and for the engine itself.



Component parts of the Schofield sleeve-valve motor

The Motor Car Repair Shop

How to Test Lubricating Oil

Various Factors to Be Considered in Determining Proper Trade

THERE are a great many motorists and garagemen who are interested in knowing how they can make tests of lubricating oils to determine the actual value of these for the exacting work required of them within the internal combustion engine. Various factors have to be considered in determining whether one grade or brand of lubricant is better than another for the purpose, and while really simple tests are out of the question, there are some things that can be done with very little trouble which will stamp an oil as good or bad.

Depending on whether or not an oil properly fulfills the functions for which it is put into the engine, the latter either will run efficiently or will be reduced to such a condition that it soon must be repaired. The lubricant affects the gasoline consumption, and, in short, a large proportion of present-day engine troubles are directly traceable to the use of the wrong kind or grade of oil. Therefore, it behooves every car owner and every man who sells cars, or repairs them, to make sure that he is supplying or using the best oil he can obtain. He either must have utter confidence in the brand he uses, or he must make sure of unknown brands by performing tests that will serve to indicate how good they are.

How to Do It

A very logical and not too complicated set of directions for oil testing by the layman is given by one of the well-known refiners, the Platt & Washburn Refining Co. These directions are as follows:

Heat Test—The reaction known as the heat test is very simple to make with any lubricating oil. Simple though it is, perhaps there is no other test which indicates so decisively and so quickly the purity and degree of refining of an oil, as well as its durability, when such an oil is subjected to the extreme high temperatures met within internal combustion engines.

The heat test consists of heating a sample of oil to a temperature of between 300 and 500 degrees Fahrenheit—depending upon the flash point—and holding same at this temperature for a period ranging from 10 to 15 minutes. Two distinctive results are obtained:

1—A good durable oil shows a slight darkening from its original color, the change in color being only to a darker shade, the oil still remaining clear and without sediment.

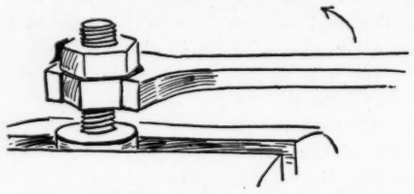


Fig. 1—Simple method of removing a stud without damaging the thread

2—A poorly refined and impure oil shows an immediate alteration in color, quickly changing to a dense black. As the heat is maintained, a black precipitate settles out. The quantity of the precipitation depends upon the impurity of the oil.

Just as different samples of oil, good or bad, retain their color or blacken during the heat test, just so will be their reaction when exposed to an even higher temperature in an explosion motor, and it is reasonable to conclude that a continuous precipitation of black sediment in impure oil will rapidly destroy its lubricating properties, and within a short time be the cause of costly wear of all parts in moving contact.

Emulsion Test—The emulsion test shows the quality of lubricating oils about as accurately as does the heat test on straight or blended hydro-carbon oils only. Wherever animal or vegetable oils are present, this test ceases to be reliable.

The emulsion test consists of vigorously shaking a sample of oil with about an equal volume of water in, say, a 4-ounce bottle, and allowing same to stand for 24 hours after shaking.

The results are:

1—A good, durable oil shows a very slight white line of demarcation where the oil meets the water below it. The water upon which the oil floats may be nearly clear or slightly cloudy in appearance, thus showing the absence of acid compounds.

2—A poorly refined oil will be seen to have emulsified or permanently mixed with the water, and to have formed a semi-fluid, reddish-white or brownish-white mass, containing a slight layer or globules of oil. This curdled mass extends nearly to the bottom of the bottle and floats upon the remainder of the water, which is a milky white. Emulsification shows the presence of acid products.

Practical Road Test—Let all oil be drained from the motor to be tested, and

Tests of Several Kinds Explained and Best Methods to Be Pursued

the brand to be tested put in, the exact weight in pounds of oil put in being carefully recorded. The amount of gasoline should also be ascertained, and a reading of the speedometer taken.

Then let a test be run over an average road, including steep hills, straight level stretches, etc., for a distance of some 50, or even 500 miles, if desired. At the end of the run all oil should be drained from the motor and weighed, the amount of gasoline used determined, as well as the exact total distance covered. The number of miles per gallon of fuel and oil can then be found by dividing the total mileage by the quantity of fuel or oil in gallons.

In order to determine the relative value of another kind or grade of oil in the same engine, a similar test should be run for the same distance, and under the same weather conditions over the same roads. This sort of testing can be done while you are driving your car right along, and whichever oil proves most advantageous after thorough trial of the several brands is by all means the one you should use constantly.

Removing a Stud to Advantage

It often is a puzzle as to just how to remove a stud from the member into which it is screwed without damaging the thread or otherwise mutilating it as well as the part from which it is desired to take it.

A handy kink for doing the job is to screw two nuts onto it, then jamming them tightly together and applying a wrench to the lower nut as in Fig. 1. They being locked together, neither can turn free of the stud, and consequently the stud itself has to turn.

The same process can be used for screwing a stud into another part, only the wrench in this case must be applied to the upper nut after you have them jammed tightly together.

Sometimes the nuts will turn unless you get them very tightly together. Use two wrenches to set them if necessary. Where any sort of bolt or nut is rusted or stuck so that it is very hard to move, apply some kerosene to the thread around the point where it is sticking and let it soak in between the thread and nut or seat. Then tap the stud or bolt lightly with a hammer, being careful not to injure the

threads. This will usually loosen it, the kerosene cutting the rust or gummy deposit and the tapping assisting in freeing it.

In tightening bolts and nuts be careful not to exert so much pressure that you strip the thread. Remember that with a considerable leverage on the wrench you are able to exert a tremendous force, and while it is very proper to set nuts tightly, they should be accorded some consideration. Often when a bolt jams in its threaded hole there is dirt or grit on the threads, and you should be sure they are clean before trying to put the two together. There is nothing more annoying than to strip threads, especially where it is very difficult to replace them.

Rule for Adjusting Silent Chains

There is nothing so destructive to a silent type chain as running it slack. If the tension is incorrect the slack side "thrashes" and this quickly beats the life out of the chain. Probably a large percentage of chains used for electric generator or starter drives give much less service than they ought to do because they are allowed to get slack. The motor car owner, and even the repairman, often is at a loss to decide how tight a chain ought to be, hence the opinion of an expert is of great value. F. L. Morse, maker of the Morse rocker joint chain, gives the following simple rule for obtaining correct chain tension. It is:

"Tighten the chain by the adjustment till it growls when running; then slack it off by slow degrees until the growl just ceases. The chain is then at the right tension."

Mr. Morse also says the adjustment is so easy that to make a mistake is almost impossible. Nearly everyone with any mechanical knowledge knows the way to adjust a cup and cone ball bearing, namely to tighten it so it runs stiff and then slack back the cone till it just, and only just frees itself. The method for chain adjustment is almost exactly similar. Mr. Morse, when asked for his adjusting rule, added that if the adjustment was reasonably accessible any man could tighten a chain properly and it was only awkwardly placed adjusting means that would make it necessary to take a car to a garage to have the chain tightened.

Italian Shop Workers Under Military Discipline

(Concluded from page 9)

porated with it. There is a decided move towards motors of 200 to 300 horsepower, these, of course, all being of the fixed-cylinder water-cooled type. This same tendency is observable in other European armies.

Despite the war, experimental work is being carried out in most of the factories and new models are being prepared, although the number of cars built for private use is decidedly small. The small, high-speed, twelve-cylinder motor—a motor of not more than 2½ inch bore, and running at 3,000 revolutions—is receiving attention; also work is being done on small, four-cylinder models, corresponding roughly to the cheaper American types, but having a more elaborate finish than usually is found on cars under $1,000.

Italy appears to be fairly independent of outside supplies except of magnetos and tires, both of which are being imported from America. The result of the war has been to make the factories more independent. Fiat, for instance, is now producing all electric equipment for its own cars—lighting and starting sets—and, it is declared, will build magnetos also within a very short time. As this factory doubtless is the largest in Europe, the move is of no small importance.

Italian, French and English motor car manufacturers intend to be independent of Germany for magneto supplies, and also, if possible, to be self-supplying in this matter. This independence has not yet been reached, for American magnetos still are selling freely. Recently a French commission agent received intimation from New York that 1,000 magnetos could be shipped immediately. A communication was sent to the five leading French motor factories, and in a few hours the lot of 1,000 had been sold and application made for 3,000 more.

Italy is very little disturbed by England's decision to forbid the importation of touring cars for private use. The volume of this business has been small, there are considerable difficulties in shipping, and the home army can absorb all that the factories can produce. France appears to be equally indifferent, for it is freely admitted that the production of private cars is not as profitable as the manufacture of shells and other war material. The net result will be that a number of Italian and French agents in London will close their show rooms.

Military Discipline for Workers

All workers in Italian factories now are under military discipline. This applies not only to men who are eligible for active service in the field and have been placed in the factories instead, but to those whose classes have not yet been called up for active service. The former are identified by a tricolor armlet, which always must be worn, and the latter have a special army badge in their buttonhole. Failure to report to work, or even late arrival, is punished immediately, and a second or third offense is liable to entail imprisonment. All strangers are kept away from the factories.

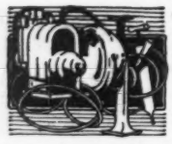
The normal working day is 10 hours, but most men do 2 hours a day overtime, making a working day of 12 hours. All factories are running two shifts. On Sundays, factories run half days. Some time ago the workers in the motor car and general engineering factories were given Saturday afternoon as a half holiday, the same as in England, but this has been abolished by order of the military authorities. One of the leading factories is endeavoring to enforce more stringent laws than are stipulated by the military authorities, and has given instructions that work must be carried on all day Sunday and on all holidays. From the standpoint of the manufacturer this is a move of very doubtful intelligence, it having been clearly proved elsewhere that if exerted beyond a certain degree labor goes stale and production falls off.

This attempt to enforce 365 working days a year is arousing the opposition of the working classes. In the socialistic press vigorous attacks are being made on the individuals directly responsible for the new conditions. There is no reason to believe that this move will become serious, for the spirit of the people is right; nevertheless there is plenty of material for the agitators, and when protesting against the attempt to speed up they do not forget to mention that last year the Fiat company earned more than $30,000,000, after paying big fees to the directors of the concern.

Gasoline now costs three times as much as before the war. Italy, of course, is shut off from European supplies and must import exclusively from America, paying high freights and insurance. The army authorities get all the gas they require for car and aeroplane services, but it is not always an easy matter for the private owner to get enough to keep a car in commission. There are no restrictions on the use of cars outside the army zone, and no attempts artificially to control the gasoline supply. Within the interior of Italy motorists can move about as freely as in peace times, provided they can get supplies of gas; but towards the frontiers very stringent regulations are in force. This applies not only to the Austrian frontier, where fighting is in progress, but to the French frontier and particularly to that of Switzerland. Unless a special pass has been obtained, these zones cannot be approached in a motor car.

BRITAIN TO REGULATE FUEL SALES

London, April 18—Claiming that gasoline must be distributed more economically, the British authorities are about to take possession of all stocks and assume control of sales to the public. Under this scheme the commercial vehicle users and the army and navy will have a preferential call, followed by doctors and other professional men. Private motorists will come last. The scheme is calling forth opposition. It is the opinion among English motorists that there is very little use of motors for purely pleasure purposes on the island.



The Accessory Corner

O-G Spark Plug

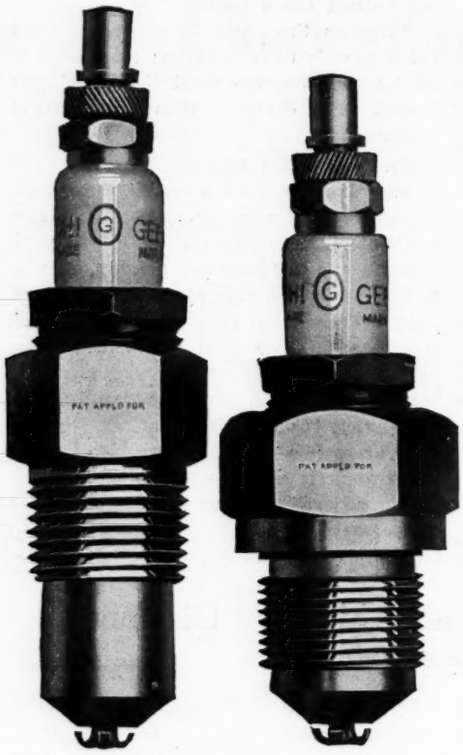
THE O-G spark plug, manufactured by S. W. Granberg, 8 South Dearborn street, Chicago, combines the features of the old German plugs and some improvements. The cone-haped spark end of this type of plug, as will be noted in the illustrations at the right, keeps the points from fouling, since all grease has a tendency to run off of it, rather than to cling to it. It will be seen that there are four points for the spark, thus insuring a hot spark and one, which, by reason of the plug extending down into the combustion considerably farther than usual, occurs nearer the center of the compressed gases. These plugs are easily taken apart for cleaning and adjustment. They are made a variety of shapes and sizes to fit any make of engine, are fully guaranteed, and sell for $1 each.

Right Gasoline Saver

The Right gasoline saver, made by the Right Motor Specialties Co., Chicago, is in principle an automatic relief valve that attaches to the manifold and admits additional air to the cylinders in greater or less amount according to the speed and load of the engine. The air intake is controlled automatically and admits air to the cylinders only when the engine is not pulling hard; that is, when the car has attained the desired speed. The valve remains closed while the motor is accelerating, so that it does not decrease the power of the motor when increasing the speed or in going up hill. If properly adjusted it does not interfere with the idling of the motor, while also it will fit any manifold and can be adapted to the peculiarities of each motor. The manufacturer guarantees a saving in fuel of 30 per cent and says that it has shown a saving of more than 60 per cent. The device can be installed in 30 minutes. It lists at $5 and is sold with the manufacturer's guarantee. It is a recent addition to the Right company's line of specialties.

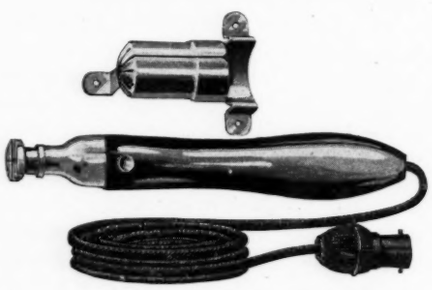
Presto Pipe and Cigar Lighter

The Presto pipe and cigar lighters and trouble lamps have had several years of popularity. The latest addition to the line by the Metal Specialties Mfg. Co., Chicago, manufacturer of the Presto lighters, is one in which the heating element is of Tungstenite-chromium nickel. The use of this alloy has reduced the cost of the lighter and the cost of replacing tips with new ones. The tip is small enough to be inserted in the bowl of a pipe. The 6-volt style, No. 199, with nickel plated holder, 10 feet of cord and Edi-Swan plug sells at $1.50. For 6, 7 or 8-volt lighters, the Tungstenite tips are included at this price. For 10, 12 and 14-volt tips, 25 cents is added, and for 16, 18 and 21-volt tips, 50 cents additional charge is made.



Two types of O-G spark plugs, extension and standard

The Right gasoline economizer



Presto pipe and cigar lighter

Twin-Safety Check for Ford Cars

A device has been put on the market by the Twin-Rim Co., Inc., Boston, Mass., which is intended to take up the rebound of the front spring of a Ford car at such times as the body swings over on the shackles and tends to throw the car out of its course, as when one wheel strikes a severe bump or rut, or in turning at speed. The front Ford spring is so built as to allow the use of the Twin-Safety check as a compensating attachment, since in operation it produces the effect that would come from the use of a half-elliptic or a cantilever spring. The Twin-Rim Co. considers it a safeguard against skidding and a means of preventing the small skids and side-sways that wear out tires. It may be obtained from dealers or will be shipped C. O. D., the price being $3.

J-M Fire Extinguisher

The J-M fire extinguisher, recently perfected and placed on the market by the H. W. Johns-Manville Co., instantly extinguishes any type of incipient blaze from any position. The device is compact, handy, safe and sure in action.

It can be pumped and aimed simultaneously, or, by a few seconds' easy pumping, enough air pressure is developed to discharge the contents in a steady stream reaching 30 feet, and under control at the nozzle lever. This feature enables the operator to use both hands to aim the stream or to aim with one hand where necessity demands in cramped quarters.

Fires of any origin, including oil, grease, gasoline, kerosene and electric arc, are extinguished with the J-M outfit.

The J-M extinguisher is included in the list of approved fire extinguishing appliances issued by the National Board of Fire Underwriters. This entitles motorists to a 15 per cent reduction on motor car fire insurance premiums.

The list price of the J-M fire extinguisher is $8, complete in nickle or brass finish with black enameled bracket, with screws for attaching to wall or motor car.

The J-M fire extinguisher fluid for recharging is sold in cans retailing at $1 in the United States and $1.25 in Canada.

Walz Direction Signal

The Auto Direction Signal Co. was organized to market the Walz direction signal, the invention of Edgar A. Walz, Jr., president of the company, which has headquarters in New York. Motor cars equipped with the device are maintained in New York for demonstration purposes. The signal is electrically operated and indicates right or left turns and gives warning when car is about to stop. It weighs 3 pounds. Two disks comprise the visible portion, and a set includes a signal for the rear, and another which is mounted on the fender at the front. Two buttons on opposite sides of the steering wheel

are the means of regulating the signals. These are placed so that the driver need not remove his hands from the wheel. The right hand controls the right signal and the left hand the signal for left turns. Pressure on both flashes arrows in both disks, indicating "Stop." Red arrows point the direction of turning. Flash lamps that are visible day or night illuminate the arrows in the disks. The price is $35.

Sunderman Mouse Trap Carbureter

Simple in construction and in adjustment, this carbureter is claimed to feed pure combustible gas from cold kerosene or gasoline to the motor without changing the adjustment, no hot air or waterjacket being needed. As shown in the illustration, the rectangular float chamber F, fitted with a primer, is adjacent to the mixing chamber, which is simply a square passage. The fuel is admitted to this passage through the jet J_1 for low speeds and when idling and when the speed is increased the taller jet J automatically comes into play so that both jets are operating at once.

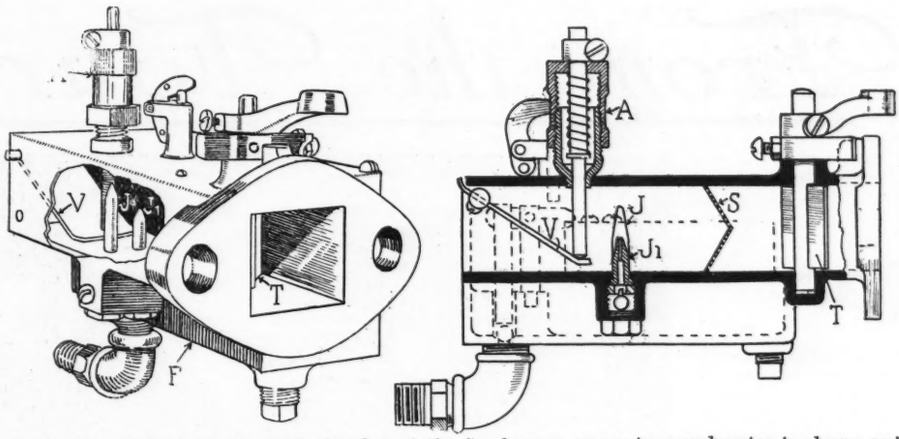
Air is drawn through the valve V which is regulated by the tension on the spring controlled by the adjusting collar A. In the illustration the air intake door as shown in the position it assumes when the motor is idling and fuel is being fed through the short jet J_1 only. As the air rushes into the vacuum behind the intake door it sweeps the globules of fuel from the jets and the resulting vapor is further disintegrated into a homogeneous mixture by passing through the screen S after which it passes the throttle T on its way through the manifold to the combustion chamber.

Beside an unusually high degree of fuel economy, the makers claim that the carbureter gives great flexibility with consequent minimized gear shifting. The screen S prevents backfiring with its attendant dangers and the elimination of a gasoline adjustment by the use of the regulating jets renders adjustment extremely simple. In fact, the makers state that when the carbureter is once set correctly, further changes will be unnecessary.

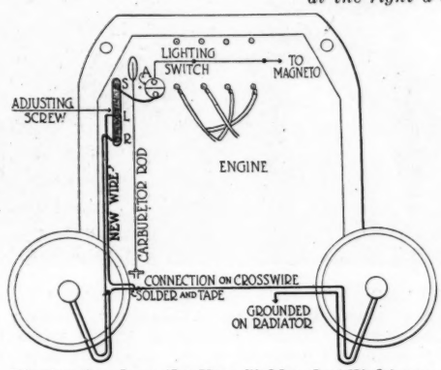
The carbureter is made in brass, iron, or aluminum alloy, in ¾-inch, 1-inch, 1⅛-inch and 1¼-inch sizes under the names of models A, B, F and C respectively, and as the model Twin F for eight or twelve-cylinder cars. Model F weighs 1¾ pounds in brass or iron and 10 ounces in aluminum alloy and is 4½ by 2½ by 1⅞ inches. The Sunderman Corp., Newburg, N. Y., is the maker, and J. F. Renfro Co., Inc., New York, sole factory distributor.

Van Sicklen Headlight Concentrator

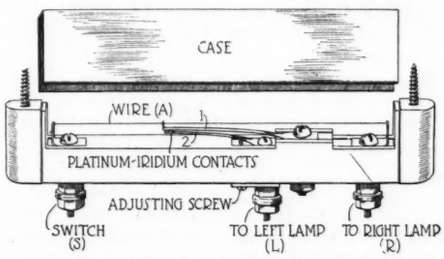
The purpose of the Van Sicklen headlight concentrator is to furnish a bright headlight on Ford machines when they are traveling slowly, this being accomplished by diverting the current in part from one lamp and directing it into the other lamp. All Ford cars since the 1914 models are equipped with electric headlights which



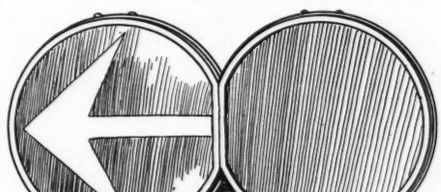
At the left the rectangular float chamber of the Sunderman mouse trap carbureter is shown and at the right a section through



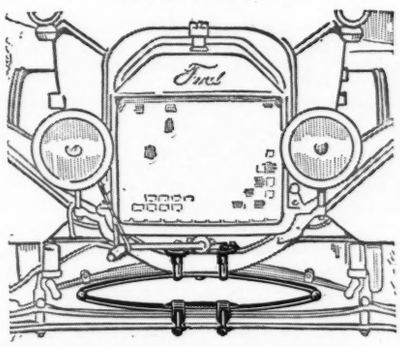
Illustrating how the Van Sicklen headlight concentrator is attached to a Ford car



Close-up of the Van Sicklen headlight concentrator



Walz direction signal



Twin safety check for Fords

are supplied with current from the magneto that supplies the current for the ignition system. Ordinarily the current varies in strength as the speed of the engine and affects the headlights. The Van Sicklen invention does not require a new type of light nor any change in focusing, and does not draw off excessive current at slow speeds since it only combines the power that is otherwise divided between two lights. It is cut into the lighting circuit between the switch and the lights with one new wire connecting the middle connecting post to the cross wire between the two lights. As it operates, the silver wire A rests upon flat spring 1 which is in contact with a shorter spring 2 while A is cool and unexpanded. At low speeds all the current entering at S is shunted through spring 2 while it is in contact with spring 1 through the platinum iridium contacts, out through L and into the left headlight only. Above 15 miles per hour, at which speed the light from both headlights is the same as the light given without the device, the wire A heats and expands sufficiently to allow spring 1 to rise and break contact with spring 2. The shunt is then broken and the current flows out through R and into both headlights.

Baird Tempograph at $25 to $75

The list price of the several models of the Baird Tempograph range between $25 and $75. In the description of these timing devices in Motor Age of April 13 it was stated erroneously that prices lower than $25 are quoted. The Baird Equipment Co., Chicago, which markets the article, manufactures a complete line of time stamps, counters, locks and telephone pay stations.

Leathertex Cone Clutch Facings

Announcement has been made of a new product of the Hide, Leather & Belting Co., Indianapolis, Ind.—Leathertex cone clutch facings. Leathertex is described as a combination of specially tanned leather and textile, the two being merged into one under 3,000-pound hydraulic pressure. The manufacturer offers to send samples gratis to dealers.

From the Four Winds

CENTENARIAN SKILLED MOTORIST—McLean county, Ill., which holds the world's record for the greasest production of corn, boasts of having the oldest driver of a motor car. Adam Waywright, of Down's township, is 100 years of age and yet is able to handle a car with the skill of a younger man. He goes motoring every pleasant day and finds great enjoyment in the pastime. He was born in Highland county, Va., and is the last of a family of twelve children. He and his wife removed to McLean county in 1856, just 60 years ago, making the trip overland in wagons. Mr. Waywright is fond of comparing the trip in the pioneer era to modern conditions with good roads and motor cars.

JACKSONVILLE, Fla., Passes Dimmer Law—Dimmers will be necessary hereafter on all motor vehicles in Jacksonville, Fla. An ordinance to this effect became operative April 15.

Reliability Tour Planned for June—The Ottawa Free Press, Ottawa, Ont., is promoting a reliability road tour over the Prescott highway. The event will take place early in June and all prizes will be donated by the Free Press.

Legislature Passes Anti-Glare Law—The New York legislature has adopted the Hewitt resolution seeking a legislative investigation to provide means to lessen the glare of motor car lights. The desired appropriation of $5,000 for expenses was cut to $4,000.

Florida Motorists Entertain Tourists—The Escambia County Automobile Association has been organized at Pensacola, Fla., by local motorists, one of the objects of the club being to entertain visiting tourists. Road improvements and desirable legislation will be promoted also.

Tire Firm Aids Owners of Stolen Cars—The owner of any motor car equipped with Pennsylvania tire who, immediately notifies the Pennsylvania Rubber Co. or any of its branches of the serial number of his tires, will receive without charge the cooperation of that organization in the recovery of his property upon its being stolen.

Twin Cities Study Conflicting Laws—To make it possible for a motor car owner to have some faint idea what rules he must comply with when he crosses the boundary line from one city to the other committees of the St. Paul Association of Commerce and the Minneapolis Civic and Commerce Association have begun work to obtain identical ordinances affecting motorists. Representatives have adopted a dimmer ordinance draft. Because the police could not fathom the meaning of the two city ordinances the new one is arranged. The dimmer ordinance provides for a police testing station where it will be determined whether headlights under suspicion throw a beam that at 75 feet is more than 3 feet above the ground.

Movie Man Should Have Been There!—The proprietor of a garage in Worcester, Mass., got even with one of the meanest motorists in the city. The man had the habit of driving down town, entering the garage, and ordering a gallon of gasoline or a pint of oil. Then he would let his car stay in the garage for 2 or 3 hours while he went about his business. He was charged storage one day. Afterward, to save storage charges he would let his car stand outside on the street. Once while it was there the owner of the building had a couple of men start clearing the snow off the roof. A fine, big slide nearly buried the car, and it does not stand there any more.

Estimate 7,000 Motor Cars in Montreal—Wallace Dawson, motor car license official for Montreal, Que., estimates that there will be over 7,000 cars in Montreal this summer. In the Province of Quebec last year 12,000 cars were licensed.

Wife Protests Ride With Other Woman—That her husband used a motor car purchased with her money to go riding with a woman not his wife, is the charge in a bill of divorce filed by Mrs. Vanda T. Walters, Bartonville, Ill. She also alleges cruelty and threats against her life. As soon as the motor car was purchased, the wife alleges, the love of her husband grew cold.

Studebaker Employes Swell War Fund—Studebaker employes at the Walkerville, Ont., factory, from the highest official to the humblest laborer, are showing their loyalty by contributing 2 per cent of their income to the Canadian patriotic fund. Each week that amount is taken from the pay envelope and turned over to a special committee which administers the fund for the Studebaker Corp.

Moving Picture Safety Crusade—A plan to promote traffic safety in Denver, Colo., by means of motion pictures is being worked out by Commissioner of Safety, Alexander Nisbet. He intends to prepare a special film showing how the most common accidents are caused, illustrating the purpose of the most important traffic rules, and showing the right and wrong way for both vehicles and pedestrians to deal with traffic conditions. The city will supply this film to all the moving picture theaters in the city.

Coming Motor Events

CONVENTIONS

May 9-12—National Assn. of Automobile Accessory Jobbers, spring meeting: Hot Springs, Va.

May 19—A. A. A. annual meeting, Washington, D. C.

June 12-16—S. A. E. annual cruise, Lake Huron and Georgia Bay.

TRACTOR DEMONSTRATIONS

July 17-21—Dallas Tex.
July 24-28—Hutchinson, Kan.
July 31-Aug. 4—St. Louis, Mo.
Aug. 7-11—Fremont, Neb.
Aug. 14-18—Cedar Rapids, Ia.
Aug. 21-25—Bloomington, Ill.
Aug. 28-Sept. 1—Indianapolis, Ind.
Sept. 4-8—Madison, Wis.

There were 272 arrests of motorists in Denver during the month of March for violations of traffic laws, and Commissioner Nisbet is seeking to remove causes for arrest by educating the public to work together for law observance and safety.

Minneapolis Has Complaint Bureau—The Minneapolis Civic and Commerce Association has opened its complaint bureau for the second year. Violations of the motor vehicle ordinances may be reported to the bureau by citizens.

Chief Uwanwaich Buys Motor Car—Peter Uwanwaich, chief of a band of Syrian nomads who passed through Spokane recently, stopped long enough to purchase a Mitchell six, which he will use instead of the old-time prairie schooner drawn by the four cayuse.

Good Start for Western County—One person in every forty in Clark county, Wash., owns some kind of a motor driven vehicle according to reports of the county auditor. Records indicate that there are 692 motor cars in this county. The money collected in license fees from these vehicles is used for road maintenance.

Mariner-Motorist Takes Car on Shipboard—Captain E. R. Sterling, well known mariner of the Pacific coast, sailed from Puget sound last week on the bark Sterling, which, in addition to a cargo of lumber that will net the skipper $45,000 profit when delivered in Australia, will also carry his Overland six, to be used by him during his sojourn in different ports. Captain Sterling is also taking along a Wyllys-Knight for a friend in Peru.

Connecticut License Fees $7,000 Per Day—Receipts from the sale of licenses and markers in the state of Connecticut since January 1, 1916, have amounted to $480,145, which exceeds by about $125,000 the sum received during the corresponding period a year ago. The number of pleasure cars last year was 34,000 and from present indications this years' issue will exceed 40,000. During one week in April the receipts of the motor vehicle department averaged $7,000 per day.

Good Roads Activities

Markers for Nebraska Route—The Denicon-Storm Lake-Okoboji air line route between Denison, Neb., and Okoboji, Neb., will be marked new this spring with large white letter "A" markers.

Penn Highway Boosters Organize—Good roads advocates, 650 in all, from the fourteen counties of Pennsylvania to be traversed by the proposed William Penn highway from Philadelphia to Pittsburgh, via Reading, Harrisburg and the Juniata valley, met in Harrisburg recently at the call of Governor Brumbaugh and organized a permanent association to work for the early completion of the project. Resolutions were passed making the William Penn highway a part of the Pike's Peak ocean to ocean highway.

Plank Western Sand Hills—The California state highway commission is building a permanent plank road across the sand hills between Yuma, Ariz., and Holtville, Cal., using heavy timber, bolted and spiked together which will be oiled and sanded on top. This road will form a link in the Ocean to Ocean highway. The damage done by the recent floods in the vicinity of Yuma has been repaired and permanent road improvements are being pushed east of that city.

Pennsylvania Improves Lincoln Highway—A great amount of constructive improvement to the Lincoln highway has been completed in Pennsylvania, where the mountain roads have been gradually reconstructed. Effort in this state has concentrated on the abolition of toll roads and grade crossings. Governor Brumbaugh has given his support, and $225,000 has been appropriated by the state toward the work. Legislation now advocated is expected to completely remove all toll charges on the Lincoln highway in Pennsylvania, which is the one state at present charging toll. Some $510,000 has been expended on Lincoln highway improvements in Pennsylvania during the last 18 months.

Nantucket, Mass., Forbids Motorists Again—The sacred precincts of Nantucket, Mass., the little isle off the southern coast of that state still retains its sacredness from the invasion of the motor car. A bill in the legislature this year which purposed to remove the restrictions against motor cars, a measure having the endorsement of a number of the islanders who were formerly opposed to allowing motor cars there, was killed.

Nebraska High Line Cutoff Shortest—The High Line cutoff, from Valley, Neb., to Central City, Neb., by way of Yutan, Wahoo, Weston, Valparaiso, Ulysses, Stromsberg and Polk, is not only shorter than the Lincoln highway between the same terminal points, but is one of the finest stretches of road in the state, according to C. H. Lindberg, president of the highway association. The road, which is marked throughout in white and yellow, with the letters "H-C" in black, runs in an almost unbroken straight line for the 60 miles between Valparaiso and Central City, and passes through one of the richest farming sections of the state. When the proposed new bridge over the Platte river at Yutan, Neb., is built, which is expected to be very soon, another straight stretch of eighteen miles will be added.

Extra Levy for Ohio Roads Valid—Most of the serious limitations of the Smith law authorizing a road levy of 1 per cent in townships of Ohio are wiped out by an opinion from the attorney general and the way opened for improvements. Levies for road purposes are not to be included in the 10 mill limitation, Attorney General Turner holds, and may be authorized outside this limit, and within the maximum limitation of 15 mills.

State Control of Highway Is Issue—Proceedings have been started in the county court of Delaware county, Pennsylvania, for the condemnation of the Philadelphia and West Chester turnpikes, on the section from Philadelphia to Newton Square. Two other cases are now pending against the Doylestown-Danboro and the Danboro-Plumsteadville turnpikes. The legal question involved in these cases is whether the local courts can overstep the authority and control of the State highway department, which has held these turnpikes as state highways.

State Officer Advises Road Experiment—Colonel William D. Sohier, chairman of the Massachusetts highway commission, has asked the legislature either to make a special appropriation or allow him to use some of the construction money of the road fund to build a few pieces of experimental highway in or near Boston for the purpose of learning if it is possible to construct something that will not be too slippery for horses. He pointed out that now there are times when oil is used on a highway, or it is tarred in such a way that it is dangerous to horses, for not only do they slip on it but the oil and tar causes sores. He wants to remedy conditions. Chairman De la Casas of the Metropolitan park commission said he would provide the stretch of roadway if the legislature authorizes the funds.

Major League Clubs
What They Are Doing

Hoosier Motor Club

What It Did in 1915—*Since last August has organized and completed over forty motor clubs throughout the state of Indiana, all affiliated with the Hoosier State and American Automobile Associations. Stimulated various local clubs to get railroad crossings improved and to post some of their roads with a 10-inch band as the Hoosier Motor Club has done, within a radius of 50 to 75 miles from Indianapolis. For instance, the organization at Muncie immediately posted the roads from Muncie to the Madison county line, and the Madison county people are posting to Pendleton, which is the point to which the Hoosier Motor Club posted from Indianapolis. Had two government engineers from the department of public roads and rural engineering at Washington, D. C., who made a tour of the state, one covering the northern part and one the southern part. They delivered twenty-six illustrated lectures on roads and road conditions.*

What It Plans for 1916—*Now launching a big road posting campaign, whereby all clubs affiliated post signs at one time, using a uniform direction sign and uniform warning sign. Main efforts this year will be devoted to road posting and to the improvement of local road conditions coupled with a united effort to get a state department of roads for Indiana. Closing contracts to have a special Hoosier State Automobile Insurance Policy, whereby it can save members considerable money and have their insurance placed in one of the strongest companies in the United States.*

Its affiliated clubs over the state have a membership ranging from twenty-five to 560. This year's work will include something in the way of traffic regulations—getting some dangerous crossings eliminated—and club runs and tours.—M. E. Noblet, Secretary.

With the Motor Clubs

Touring Bureau Is Organized—The Conneaut Automobile Club, Conneaut, O., has established a touring bureau for the purpose of distributing road information to its members and to motorists generally.

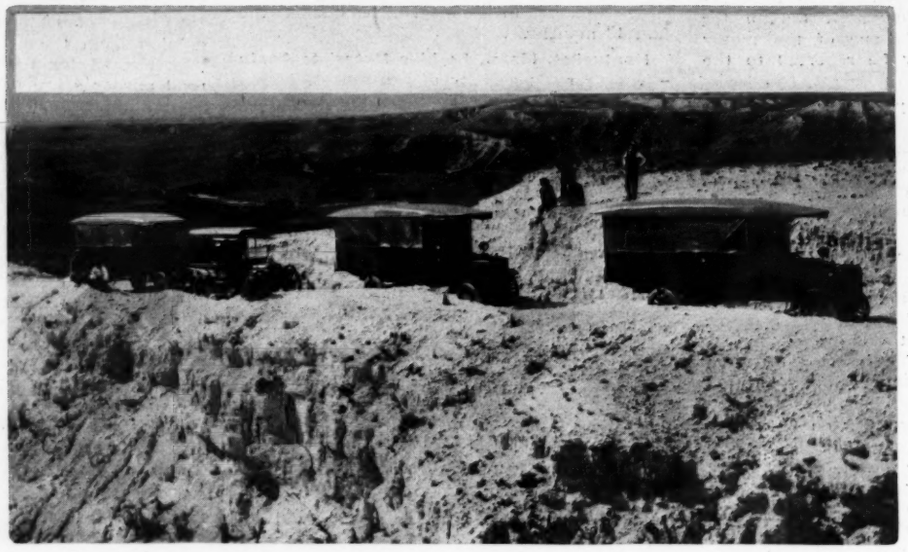
F. C. Hahn Manager of Columbus Club—Frank C. Hahn has been elected temporarily manager of the Columbus Automobile Club, Columbus, O., to fill the vacancy caused by the resignation of H. K. Laird. Mr. Hahn has been assistant manager for the last 2 years.

Members Complain of Road Work—The methods of several of the commissioners of McLean county, Ill., who are said to be neglectful of their duty in not dragging the roads when the work should be done, have become the subject of complaint to the McLean County Automobile Club.

Another Ohio City Starts Club—The Bremen Automobile Club, Bremen, O., is one of the newer organizations of motor clubs in the Buckeye state. It starts with a membership of seventy-five and has become affiliated with the Ohio Automobile Association.

Holding Down Gasoline Prices—Garages which charge exhorbitant prices to tourists in Nebraska will be the object of special attention on the part of the Omaha Automobile Club, Omaha, Neb. Members who travel over this and neighboring states and use their cars daily have volunteered to cooperate with the club in sending in reports of such garages, the names of which will be duly listed at the club's information bureau.

Among the Makers and Dealers



TRAVELING MOTOR TRUCK SHOWS—Is the use of the motor truck causing a revival of the old-time wagon train circus and animal show that in the days before combinations in this amusement field traveled over the country, bringing delight to the young and old of the more remote and smaller country towns? It would seem so. At any rate, men in the business say there will be more overland traveling circuses and shows on the road this season than ever before. Most of them have adopted the motor truck for the transportation vehicle with which to move about in. The above picture of Whitehead's Shows motor truck caravan was taken as it was mounting the cap-rock near Crosbyton, in western Texas, shortly after it started from its winter headquarters. Before finishing its itinery of the season this show will have covered most of the states situated west of the Mississippi river.

NEW Factory for Utility Products—The Hill Pump Valve Co., Chicago, maker of the Utility line of motor car specialties, has removed to its new factory at Archer avenue, Canal and Twenty-third streets, Chicago..

Canadian Ford Exceeds 1915 Record—The figures for total production of the Ford Motor Car Co., of Canada, Ltd., Ford, Ont., for the fiascal year ending in 1915 have been exceeded already in 1916, with 3½ months of the present fiscal year to go.

Westinghouse Ford Starter at $85—The Westinghouse Electric & Mfg. Co. has recently announced an increase in the retail price of its starting and lighting equipment for Ford cars to $85. This increase is due to the marked rise in the cost of raw materials.

Reeke Manages Jeffery Sales—Alfred Reeke, president of the Reeke-Osmond Motor Car Co., Milwaukee, Wis., state agent for the Jeffery, has been appointed general sales manager of the Thomas B. Jeffery Co., Kenosha, Wis., and assumed the duties May 1. Mr. Reeke takes the position of Edward S. Jordan, who resigned some time ago to become head of the Jordan Motor Car Co., which now is erecting a factory at Cleveland, O.

Spear with Gramm-Bernstein—R. H. Spear has been appointed general sales and advertising director of the Gramm-Bernstein Co., Lima, O.

Riley Goes to Jordan—W. B. Riley, formerly assistant sales manager Thomas B. Jeffery Co., has become assistant to E. S. Jordan in the direction of sales of the Jordan Motor Car Co., Cleveland, O.

Inforce Dealers' License Law—New Jersey motor vehicle inspectors are going after dealers who permit the use of their license tags on cars other than those held for sale. The New Jersey law limits the use of a dealer's license very closely, but has not been so strictly inforced before. David R. Mitchell, Dodge dealer in Bridgeton, N. J., was haled into court by Inspector Lovett for allowing his sales tags to be used on ac ar he rented to the local postoffice for parcel post service. Despite his protests that he had been unable to secure other tags from the local agent of the motor vehicle department, a fine of $25 was imposed.

Service to Owners of Keeton Cars—The Puritan Machine Co., Detroit, Mich., recently purchased from the defunct Keeton Motors, Ltd., whose factory was located at Brantford, Ont., the stock of parts, blueprints, drawings, jigs, dies and tools, etc., and will continue service to Keeton car owners from the Puritan plant at Detroit.

Quick Change Feat at Ford Branch—Moving an establishment in a day is the record set by the Ford Motor Co., Winnipeg, Man. At 6 oclock Saturday, April 15, the Water street branch ceased business. At 6 oclock Monday morning, April 17, the Ford company's branch on Portage avenue West began operations. Everything was in place. In this building the business for the western Canadian territory of the Ford organization will be conducted in future. It is the idea of the head office to manufacture Ford cars in Winnipeg also at a later date.

Recent Incorporations

Chatam, Ont.—Hayes Wheel Co. of Canada, capital stock $200,000.

Cleveland, O.—Marathon Tire Co., capital stock $5,000; incorporators, W. H. Jenks, W. F. Ridge, R. D. Jenke, H. E. Andress and C. G. Wise.

Cincinnati, O.—Magic Auto Cleaner Co., capital stock $10,000; incorporators, C. B. Funk, H. G. Settle, C. E. Sloneker, R. O. Deardorff and T. M. Gregory.

Chicago, Ill.—City Auto Packing Co., capital stock $35,000; incorporators, A. V. Jackson, J. S. Deming and D. X. Jarrett.

Edgewood, W. Va.—Ohio Valley Motor Co., capital stock $10,000; incorporators, W. C. Knoblaugh, A. A. Tenill, Charles L. Herb, W. C. Knoblaugh, Jr., J. L. Robinson.

Ford, Ont.—Ford Motor Car Co., capital stock $10,000,000.

Kamms, O.—West Park Auto Co., to deal in motors cars, capital stock $5,000; incorporators, E. E. Parsons, W. M. Fisher, A. E. West, Mrs. G. B. West and A. B. Parsons.

Louisville, Ky.—Winklemann-Schade Motor Co., capital stock $20,000; incorporators, W. F. Winklemann, Walter Schade and Bessie Hines.

Montreal, Que.—Gill Motor Co., capital stock $100,000; incorporators, G. M. Smyth, T. M. Gill, J. B. Poisson and others.

Norwalk, O.—Norwalk Auto Parts Co., to manufacture motor car parts, capital stock $100,000; incorporators, W. Wickman, R. D. Wickman, C. M. Schock, E. C. Martin and F. E. Watts.

Philadelphia, Pa.—Arrow Automobile Co., to manufacture motors and machine supplies, capital stock $2,000,000; incorporators, J. M. Sweeney, Joseph Baker, J. L. Harkins.

Rapid City, S. D.—Boyd-Romans Automobile Co., capital stock $25,000; incorporators, C. F. Boyd, R. F. Romans, J. D. Romans.

Wilmington, Del.—Weiss Engine Co., to manufacture, sell and deal in and with all kinds of motors, cars, etc., capital stock $750,000; incorporators, H. E. Latter, N. P. Coffin, C. M. Egner.

Wadsworth, O.—Wadsworth Tire and Supply Co., capital stock $3,000; incorporators, Ross M. Trump and others.

Wadsworth, O.—Broad Street Garage, capital stock $15,000; incorporator, John H. Richard.